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A REVIEW FOR A BETTER BREAKOUT CANDIDATE
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by

Stephen J. Olson

December 1987

Thesis Advisor: Alan W. McMasters

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REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED			1b. RESTRICTIVE MARKINGS	
2a. SECURITY CLASSIFICATION AUTHORITY			3. DISTRIBUTION AVAILABILITY OF REPORT Approved for public release; distribution is unlimited	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE				
4. PERFORMING ORGANIZATION REPORT NUMBER(S)			5. MONITORING ORGANIZATION REPORT NUMBER(S)	
6a. NAME OF PERFORMING ORGANIZATION Naval Postgraduate School		6b. OFFICE SYMBOL (If applicable) Code 54	7a. NAME OF MONITORING ORGANIZATION Naval Postgraduate School	
6c. ADDRESS (City, State, and ZIP Code) Monterey, California 93943-5000			7b. ADDRESS (City, State, and ZIP Code) Monterey, California 93943-5000	
8a. NAME OF FUNDING / SPONSORING ORGANIZATION		8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
8c. ADDRESS (City, State, and ZIP Code)			10. SOURCE OF FUNDING NUMBERS	
			PROGRAM ELEMENT NO.	PROJECT NO.
			TASK NO.	WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) A REVIEW FOR A BETTER BREAKOUT CANDIDATE PREDICTOR THAN ANNUAL BUY VALUE				
12. PERSONAL AUTHOR(S) Olson, Stephen J.				
13a. TYPE OF REPORT Master's Thesis		13b. TIME COVERED FROM _____ TO _____	14. DATE OF REPORT (Year, Month, Day) 1987, December	
15. PAGE COUNT 129				
16. SUPPLEMENTARY NOTATION <i>None</i>				
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP		
			(BOSS); Breakout; Competition Models; Annual Buy Value (ABV); NAVICP; Provisioning; Competition;	
19. ABSTRACT (Continue on reverse if necessary and identify by block number)				
<p>The purpose of the Navy's breakout program is "to improve the acquisition status of replenishment spare parts through either, (1) identification of the actual manufacturer of an item, or (2) the competitive procurement of a part that was previously purchased noncompetitively." [Ref. 1: p. S6-103.6] The program, as established by the Department of Defense (DOD) in 1983, had the annual buy value (ABV) as its determinator of candidate items. Since 1983 considerable sophistication has evolved in the breakout determination process. In particular, three models have been developed by various services to replace the ABV approach. This thesis develops a similar model for Navy use. Since such models depend on technical data, the procuring of such data is also considered. The obvious conclusion is that technical data should be obtained during the initial provisioning process. <i>Knowledge;</i></p>				
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a. NAME OF RESPONSIBLE INDIVIDUAL Prof. Alan W. McMasters			22b. TELEPHONE (Include Area Code) (408) 646-2678	22c. OFFICE SYMBOL Code 54Mg

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A Review for a Better Breakout Candidate
Predictor than Annual Buy Value

by

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B.A., University of Nebraska-Lincoln, 1978

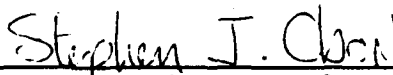
Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

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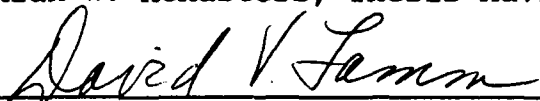
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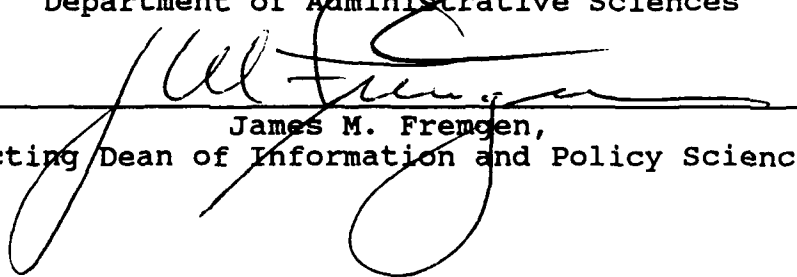

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ABSTRACT

The purpose of the Navy's breakout program is "to improve the acquisition status of replenishment spare parts through either, (1) identification of the actual manufacturer of an item, or (2) the competitive procurement of a part that was previously purchased noncompetitively." [Ref. 1:p. S6-103.6] The program, as established by the Department of Defense (DOD) in 1983, had the annual buy value (ABV) as its determinator of candidate items. Since 1983 considerable sophistication has evolved in the breakout determination process. In particular, three models have been developed by various services to replace the ABV approach. This thesis develops a similar model for Navy use. Since such models depend on technical data, the procuring of such data is also considered. The obvious conclusion is that technical data should be obtained during the initial provisioning process.



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LIST OF ABBREVIATIONS AND ACRONYMS

ABV	Annual Buy Value
AFLC	Air Force Logistics Command
AFBRMC	Air Force Business Research Management Center
ALC	Air Logistics Center
AMC	Acquisition Method Code
AMSC	Acquisition Method Suffix Code
APRO	Army Procurement Research Office
APL	Allowance Parts List
ASO	Aviation Supply Office
BOSS	Buy Our Spares Smart
BRF	Best Replacement Factor
CABS	Competitive Acquisition and Breakout of Spares
CDAP	Competition Decision-Assist Package
CDRL	Contract Data Requirements Lists
CNA	Center for Naval Analysis
CNO	Chief of Naval Operations
COSAL	Coordinated Shipboard Allowance List
CTIC	Contractor Technical Information Code
DAR	Defense Acquisition Regulation
DCA	Design Control Activity
DEN	Data Element Number
DLA	Defense Logistics Agency
DOD	Department of Defense

FGC	Federal Group Code
FMSO	Fleet Material Support Office
FSC	Federal Supply Code
FSCM	Federal Supply Code for Manufacturers
FY	Fiscal Year
GAO	General Accounting Office
HM&E	Hull, Mechanical & Electrical
HSC	Hardware Systems Command
ICP	Inventory Control Point
ILS	Integrated Logistics Support
ISEA	In-Service Engineering Activity
LSA	Logistics Support Analysis
LSAR	Logistics Support Analysis Record
MDF	Maintenance Data File
MIL-STD	Military Standard
NAVPRO	Navy Plant Representative
NAVSEA	Naval Sea Systems Command
NAVSEALOG	NAVSEA Logistics Center
NAVSUP	Naval Supply Systems Command
NIIN	National Item Identification Number
NRFI	Not Ready For Issue
NSN	National Stock Number
OFPP	Office of Federal Procurement Policy
PESA	Provisioning Engineering Support Activity
PPS	Provisioning Performance Schedule
PRS	Provisioning Requirements Statement

PSD	Program Support Data
PRTS	Provisioning Requirements Technical Specification
PSI	Program Support Interest File
PSICP	Program Support Inventory Control Point
PTD	Provisioning Technical Documentation
QPL	Qualified Producers List
RFI	Ready For Issue
RSR	Repair Survival Rate
SECNAV	Secretary of the Navy
SHAPM	Ship Acquisition Project Manager
SM&R	Source, Maintenance & Recoverability Code
SOW	Statement of Work
SPAWAR	Space and Naval Warfare Systems Command
SPCC	Ships Parts Control Center
SPS	Statement of Prior Submission
SPTD	Supplementary Provisioning Technical Documentation
SUPSHIP	Supervisor of Shipbuilding, Conversion, and Repair, USN
TDP	Technical Data Package
TRF	Technical Reference File
UICP	Uniform Inventory Control Point
WSF	Weapons System File

ACKNOWLEDGMENT

I would like to express my eternal gratitude to my wife, Connie, who put up with all of the paper and notebook binders on the dining room table, while I plowed through the research review portion of this thesis.

And lastly, "three cheers for those we leave behind."

I. INTRODUCTION

A. GENERAL

Since its inception in 1983, Breakout has played a very important role in generating second sources for many existing items stocked in the Navy Supply System. Breakout is the process of improving the acquisition status of replenishment spare parts through either, (1) identification of the actual manufacturer of an item, or (2) the competitive procurement of a part that was previously purchased noncompetitively. [Ref. 1:p. S6-103.6]

The general breakout procedure is to review sole source items of supply, which broach a threshold of \$10,000 annual buy value (ABV), for technical data sufficient to make subsequent reprocurements competitively. If the government possesses the technical data to competitively reprocure the item, then open competition results. However, in many cases the technical data is lacking and/or cannot be procured from the original equipment manufacturer, and the reprocurement usually reverts to a sole source buy. The Breakout program is geared to procure technical data for items that are deemed economically feasible upon completion of the technical review process.

When first mandated by the Defense Acquisition Regulation Supplement No. 6 in June 1983, the pool of

candidates within the Navy Supply System for technical review was rather large. The supply system contained over 500,000 items managed by the Ships Parts Control Center (SPCC), and over 247,000 managed by the Aviation Supply Office (ASO). Due to this large pool and the rather low level of competitive procurements at the time (only 21.1% for SPCC and 9.1% for ASO), determining breakout candidates was a relatively easy process. [Ref. 2:p. 4]

In recent years determining breakout candidates has become more difficult due to a reduction of this pool through Breakout success and other methods (e.g., BOSS, Price Fighter, Reverse Engineering, and improved competitive measures in new weapon systems acquisitions.) What was once a "target rich environment" for Breakout candidates is beginning to dwindle. To ensure the continuing success of the Navy's Breakout Program, a more refined breakout candidate predictor is necessary.

B. OBJECTIVES OF THE RESEARCH

The objective of this study is to develop a better methodology to use in breakout candidate determination, and to apply this methodology to the provisioning process. The applications will be limited to the two Navy Inventory Control Points (the Ships Parts Control Center at Mechanicsburg, PA, and the Aviation Supply Office at Philadelphia.)

C. SCOPE OF THE STUDY, LIMITATIONS, AND ASSUMPTIONS

The study focused on the breakout of replenishment spare parts and the associated relationship with the provisioning process. The economic model and assumptions of the Department of the Defense (DOD) Breakout process were considered and changes proposed when evidence justified it. Component breakout (i.e., breakout on a form, fit, or function level) and other areas of competition were not the central concern of this research, but are mentioned when appropriate to the case under study.

Though breakout models and methodology from other services are discussed, the intent of this thesis is to develop an improved Navy breakout model. No attempt is made to develop a better DOD-wide model, nor is any effort made to analyze the application of the new model to the breakout operations of other services.

D. RESEARCH METHODOLOGY

The research methodology utilized in this study involved first an indepth review of the available literature, followed by personal interviews with both policy and operational persons involved with the breakout process.

The literature utilized in this study was obtained from the Naval Supply Systems Command; the Naval Sea Systems Command; the Ships Parts Control Center; the Aviation Supply Office; the Fleet Material Support Office; the Naval Sea Systems Command Logistics Center, Mechanicsburg; the Army

Procurement Research Office; the General Accounting Office; the Naval Postgraduate School Library; the Defense Logistics Information Exchanges (DLSIE); and the Defense Technical Information Center (DTIC).

Personal interviews were conducted with logistics and technical personnel at the Ships Parts Control Center; the Fleet Material Support Office; the Aviation Supply Office; and the Naval Sea Systems Command Logistics Center. Telephone interviews were conducted with policy personnel at the Office of the Secretary of Defense; the Office of the Secretary of the Navy; and the Naval Supply Systems Command. All personal and telephone interviews were informal and structured around the guidelines provided by the questions stated in Appendix A.

E. ORGANIZATION OF THE STUDY

A brief discussion of breakout and provisioning is provided as Chapter II. It is followed by a review of three existing breakout models in Chapter III. These breakout models were developed by different services and contain elements which have potential for application to the Navy's replenishment breakout process.

A proposed breakout model for use at the Navy ICPs is then presented in Chapter III, and is the major contribution of this thesis. Chapter IV discusses several issues related to the breakout process which were discovered during the

research, but which cannot be quantified as part of any model.

Chapter V presents a summary of the thesis, conclusions drawn from the research, and recommendations for the application of the research results.

II. THE CURRENT PROVISIONING-BREAKOUT PROCESS

A. BACKGROUND

Provisioning and breakout have grown into two of the major ongoing processes at the Navy's Inventory Control Points (ICP). The most widely accepted definition of provisioning in both the supply and technical community is [Ref. 3:p. B-6]:

Provisioning is the process of determining and acquiring the range and depth of new items of spares and repair parts, and support and test equipment required to operate and maintain an end item or material for an initial period of service.

Provisioning is a procedure by which the U.S. Navy supplies and outfits its ships and other activities. Simplified, provisioning is an incremental process required to develop the initial Allowance Parts List (APL) from Provisioning Technical Documentation (PTD) provided by a contractor. This procedure is initiated upon the award of a government contract for equipment. Provisioning is an involved process which begins with delivery of PTD to an In-Service Engineering Activity (ISEA) for technical review and acceptance. PTD then flows to an ICP which completes technical item coding and supply management coding, makes stock/allowance computations, and decides on other issues relative to inventory management. The end product APL identifies a component and its parts as well as the range

and depth of material required for support. The APL is ultimately integrated into the Coordinated Shipboard Allowance List (COSAL) for use by shipboard personnel to order parts and off-load parts not required on board. [Ref. 4:p. IA-1-1]

Breakout is associated with existing items of supply. Its purpose is to make items competitively reprocurable. Breakout is defined as [Ref. 1: p. S6-103.6]:

The improvement of the acquisition status of a part resulting from deliberate management decision. Examples are:

- (i) the competitive acquisition of a part previously purchased noncompetitively, and
- (ii) the direct purchase of a part previously purchased from a prime contractor who is not the actual manufacturer of the part.

The process involves the identification, selection, screening and procurement of technical data for items where savings on future reprocurments are expected to exceed the costs associated with doing the breakout process. The technical review results in the assignment of an Acquisition Method Code (AMC) and an Acquisition Method Suffix Code (AMSC). The AMC is a numeric code which describes the result of a technical review of a part, and it ranges from "item is fully competitive" to "acquire item only from prime contractor." [Ref. 1:p. S6-201.1] The complete list of AMCs is included in Appendix B. The AMSC is an alpha code which further describes the AMC by adding information concerning the status of a part in areas of engineering,

manufacturing and technical data. These range from "government has full rights to use the data" to "the design of this part is unstable." [Ref. 1:p. S6-201.2] The complete list of AMSCs is included as Appendix C.

The combination of these codes form a matrix which is used by contracting personnel to determine the correct method of competition that can be used to procure the item. The Acquisition Method/Suffix Code Correlation Table is included as Appendix D.

The requirement to perform breakout reviews is not applicable to parts in provisioning. [Ref. 1:p. S6-101] The reason is one of expediency. The process of reviewing and collecting the technical data in order to make an item competitive is time-consuming. To hinder items in the provisioning process would incur a greater risk of material nonavailability early in the equipment's life. This nonavailability could have negative impact on fleet readiness. [Ref. 5]

At first glance it might appear that the concepts of provisioning and breakout are not mutually agreeable. In fact, the two are quite complimentary, especially in regard to technical data. As will be discussed later, the availability of technical data is at the crux of successful item breakout. Provisioning is the process where the Government has the best chance of procuring the required technical documentation. Heretofore, these two processes

have been considered as independent. It is an intent of this thesis to argue for a stronger bond between breakout and provisioning.

B. THE PROVISIONING PROCESS

Provisioning begins with the receipt of PTD from a contractor. It can either be in paper or computer tape format. The information that makes up the PTD package includes drawings, parts lists, technical manuals, performance data, and any other appropriate procurement data. The more detailed the PTD, the better the final APL and supply support for the item will be.

The provisioning process is an eight-step process. Each PTD package received is identified to a project and is screened for an existing APL. Prior to induction into the provisioning process, PTD packages are checked to see if an APL already exists. If the PTD package can be matched to an existing APL, then the package is returned by the ICP to the submitting activity (i.e., an equipment contractor or shipbuilder) indicating the existing APL number. If the project cannot be matched to an already existing APL, then the following process results:

- (1) PTD Receipt and Review. During this phase the provisioner validates the line data for errors or missing data elements. Corrections and additions are made. This review can be either done manually if paper PTD is received, or via electronic review on

the Ships Provisioning System (SPS) if the PTD was received via electronic tape. PTD is the skeletonized framework from which all the required supply and management codes for the items will be attached throughout the provisioning process.

- (2) Lead APL (LAPL) Review. This step is applicable only to Hull, Mechanical & Electrical (HM&E) provisioning. The applicable LAPL for a provisioning project is called up on the computer terminal and technical coding is assigned to the line items in the project. Technical coding is developed by the Hardware System Command (HSC) engineering activity, and consists of data elements such as replacement factors, essentiality coding, allowance overrides and source, maintenance and recoverability (SM&R) codes. Technical coding for non-HM&E equipments is developed as part of the equipment contracts and is included as part of the PTD package received from the contractor.
- (3) Defense Logistics Services Center (DLSC) Screening. All manufacturers' FSCM/part numbers are screened against the DLSC files to determine if an existing stock number already exists, thus negating any further cataloging requirements. After this mechanized screening is completed, Navy Item Control Numbers (NICNs) are assigned to all items which did

not cross to a stock number. These non-crossed items will be logged into the DLSC system and assigned a stock number in the future.

- (4) Item Coding. Upon completion of the DLSC screening, the provisioner will assign various supply related data elements to each item. This coding is based upon information that is already known about the item such as SM&R coding, essentiality, or drawing characteristics. Examples of such data elements include cognizance symbol, Federal Supply Class (FSC), Acquisition Advice Code, and item management coding (which indicates if the inventory management of the item should be retained or passed onto the Defense Logistics Agency (DLA)).
- (5) Packaging and Preservation. At this point the tasks of the provisioner are completed and the provisioning project is electronically forwarded for packaging assignments. Packaging and preservation codes are used for determining shipping requirements and preservation techniques applicable to the class of item.
- (6) Files Load. This is the process where all of the information is actually loaded onto the Weapons System File. The skeletonized record in the form of PTD now includes item identification through the Defense Logistics Services Center (DLSC), technical

coding via the HSC engineering activity, and supply and packaging data. On a weekly basis a batch program is run which generates a Files Load Transaction Tape. On this tape are actions to load the C10 Files, the Master Data File (MDF), the Program Support Interest File (PSI), the Technical Reference File (TRF), the Weapons System File (APL Line Item Data), the Component Characteristics File (APL Header Data), and the Master Allowance Parts List File (Electronic Reference Symbol Number Data--APL Section B).

- (7) Generation of Computations. Once the files have been loaded, the provisioning project is ready for the final step, which is computation of requirements. SPS itself does not perform these computations; however it does initiate the process. The provisioner loaded the necessary data up front to build what is called a computation header. This computation header will trigger requirements determination by passing to the Mechanized Program the needed project and equipment level data. The header information identifies what type of computations are desired, the allowance model to be used, equipment population and support dates.
- (8) Provisioning Procurement and APL Generation. After the requirements for allowances and system stock have

been mechanically computed, the results are passed onto the provisioner for review. The provisioner revises the allowance quantities as required. Once done, the project is released to generate procurement requests (PRs), Planned Program Requirements (PPRs), Supply Support Requests (SSRs), and cataloging requests for all new ICP managed items. A hard copy APL can then be requested for quality review prior to fleet distribution.

The figure in Appendix E depicts graphically the provisioning process. As one can see, it is circuitous in nature. Modifications to the equipment's baseline configuration will result in a reprovisioning effort to bring the APL back into agreement with the equipment make-up.

C. MAJOR PROVISIONING CONCERNS

The final APL and its associated supply support posture brought to fruition in the provisioning process is a result of advance planning on behalf of the Integrated Logistics Manager of the Hardware Systems Command procuring the equipment.

Provisioning can theoretically be (and sadly, in fact actually is) sometimes accomplished with the barest of information. The consequence is reduced supply support for the life of the equipment. Logistics managers have general guiding doctrine concerning the level of detailed PTD

required for their program. Unfortunately, the current trend is to require the minimal level from the contractor in order to reduce the logistics cost of their respective programs. Many logistics managers consider logistics something to cut to the minimal level because it does not materially benefit the program. Additionally, program managers tend to focus on the up-front costs of developing and funding a program, and they often neglect funding requirements for logistics support. Logistics managers must ensure that logistics elements receive the correct level of interest and funding.

Provisioners have difficulty in the transition between the various provisioning military standards, since each one calls out different, unique requirements from the submitting contractor. With the number of contractors and the continuing procurement of equipments by the HSCs, it is not surprising to sometimes have the same contractor providing provisioning information to satisfy two different provisioning requirements. Since provisioners are interested in establishing an accurate and complete database in the C10 files (MDF/PSI/TRF), they wish to load as much technical documentation as possible for each item on an APL. The determination of provisioning requirements is very loosely controlled by the HSCs. This inconsistency results in some programs having more technical data than required for provisioning, while leaving other programs with marginal

data. Appendix F lists those documents currently required by the HSCs for equipment provisioning.

The delivery of data is also a major concern with provisioners. "Ordinarily level 2 engineering data are required to be delivered with military systems at provisioning. Often, level 1 data are furnished." [Ref. 6:p. 2-8] Level 2 data contain detail and arrangement drawings necessary for adequate provisioning of the equipment. Level 1 data contain minimal arrangement information which generally is not adequate for provisioning. The current trend is to procure level 3 drawings. Level 3 drawings coupled with Type C product specifications, [Ref. 7:p. 2-5]:

contain all the information needed for competitive reprourement. [They] . . . provide engineering data for quality production of an end item of equipment and for competitive reprourement of spare parts substantially identical to the original item.

With only the minimal technical data provided with the provisioning, an ICP has a difficult time completing the appropriate level of provisioning. Additionally, when technical data are not provided at the time of provisioning, the chances of procuring it later from the contractor is marginal. If a vendor goes out of business, it may never be possible to obtain the data at a later time. And the longer the period from provisioning, the lesser the chance of procuring the technical data. [Ref. 6:p. 2-14]

The problem with technical data and provisioning was one of the findings of a Defense Logistics Agency (DLA) procurement study. The DLA study group found that [Ref. 6:p. 2-14]:

. . . the Government is not seizing the initiative to require and diligently monitor contractor delivery of complete and adequate technical data at provisioning. Provisioning is virtually the only time a commercial producer or vendor may ever deliver data, yet too often the Government does not take the opportunity to acquire the data.

D. THE BREAKOUT PROCESS

The breakout process can be broken down into two major thrusts: (1) limited screen breakout actions, and (2) full-screen breakout actions. The object is the same between the two types of actions, however there is a difference in the time available to perform the technical breakout review. Full screen review actions are completed when reprocurring replenishment parts for the supply system. The Stratification program used for ICP spares budget formulation is the starting point for full screen candidate identification. Since the replenishment procurements are for future needs and not current backorders, a longer breakout process can be used. Limited screen breakout is used for currently pending procurements which cannot be delayed without bringing on negative customer material impact. Therefore, a shorter review process is initiated.

1. The Full Screen Breakout Process

The full screening process involves 65 steps in a decision, and is divided into the following six phases [Ref. 1:p. S6-303]:

- (1) Data Collection;
- (2) Data Evaluation;
- (3) Data Completion;
- (4) Technical Evaluation;
- (5) Economic Evaluation; and
- (6) Supply Feedback.

The complete 65 step process is detailed in Appendix G. As one can see, it is a rather complicated affair, and the review process does tend to slow down repair part reprocurement action. An explanation of the work involved in each of the six phases seems appropriate at this time.

a. Data Collection

During this phase all available technical, contract and identifying data are collected and a file is established for the item. Pertinent information includes cataloging and standardization information, contracting history, identification of the design control activity and the cognizant engineering activity, the expected life of the item, and collecting of existing drawings. Data collection is accomplished in step 1, as illustrated in Appendix G.

b. Data Evaluation

Data evaluation is the most critical process in the whole breakout procedure. It involves determination of the adequacy of the data and the Government's right to use the data for reprourement action. Data evaluation is separated into two stages [Ref. 1:p. S6-303.2]:

- (i) A brief but intensive analysis of available data and documents regarding both technical matters and data rights, leading to a decision whether to proceed with screening; and
- (ii) If the decision is to proceed with screening, further work necessary to produce an adequate technical data package, such as research of contract provisions, engineering work on drawings, and requests to contractors for additional data.

If the government cannot obtain the requisite technical data, the item is dropped from further breakout consideration. Data evaluation is accomplished in steps 2-14, as illustrated in Appendix G.

c. Data Completion

The data completion phase is concerned with acquiring or developing the missing technical data. In this phase, items will belong to one of four categories:

- (1) Items where the data package is complete and adequate for unlimited Government use;
- (2) Items where the Government possesses full rights to use the data but some of the data are missing;
- (3) Items where the data package is complete, but the Government does not possess full rights to use the data; and
- (4) Items where neither the data package nor the rights of the Government are adequately established.

The object of this phase is to establish the adequacy of the data and the Government's right to use the data, or to eliminate the item from further breakout review. Steps 15-21 of Appendix G illustrate the data completion phase.

d. Technical Evaluation

The purposes of the technical evaluation phase are [Ref. 1:p. S6-303.4]:

. . . to determine the development status, design stability, high performance, and/or critical characteristics such as safety of personnel and equipment; the reliability and effective operation of the system and equipment in which the parts are to be used; and to exercise technical judgement as to the feasibility of breaking out the parts.

The result of the technical review could be the elimination of further breakout consideration via assignment of one of three AMC codes at this junction:

- (1) AMC K: Parts are produced from Class 1A Castings and similar type forgings and approved source control is required.
- (2) AMC M: Parts are produced from master or coordinated tooling, e.g., numerically controlled tapes and master tooling is required for production.
- (3) AMC N: Parts require special test and/or inspection facilities to determine and maintain ultra-precision quality for the function or system integrity.

Even though these three codes indicate that limited breakout potential exists, the Defense Acquisition Regulations (DAR) Supplement No. 6 states [Ref. 1:p. S6-303.4]:

Certain manufacturing conditions may reduce the field of potential sources. However, these conditions do not

justify the restriction of competition by the assignment of restrictive AMC's. . . .

The DAR goes on to say that other firms can produce type 1A castings or they can obtain them from approved sources; that master tooling can be reproduced; and that adequate inspection and testing facilities may be available at other firms. The object is not to reduce breakout efforts merely on the grounds of an AMC assignment. However, the current economic analysis model rejects any item from breakout consideration if it has one of these restrictive AMC codes.

Design stability of the item must also be considered. Screening on parts that are anticipated to undergo a design change should be deferred until the design is stable. Several other considerations deal with qualification testing, quality assurance procedures, and new source approval/acceptance. Steps 22-37 of Appendix G illustrate the technical evaluation phase of breakout.

e. Economic Evaluation Phase

Economic evaluation cuts to the heart of the breakout decision. The object is simply to identify and estimate the breakout savings and the direct cost offsets to breakout. It is composed of five segments [Ref. 1:p. S6-303.5]:

- (1) Development of breakout savings by determining the remaining program life of an item and multiplying by the 25% savings factor.
- (2) Computation of breakout costs by collecting, summarizing and comparing the following costs:

- (a) Direct costs which includes all expenditures which are direct and wholly identifiable to a specific, successful breakout action, and which are not reflected in the unit price. These include Government tooling or special test equipment, qualification testing, quality control expenses, and industry specific costs not otherwise borne by the Government.
 - (b) Performance specification costs which are applicable if the item is constructed to a performance specification. These costs would include additional cataloging costs, additional bin opening costs, additional management costs, additional technical data costs, and additional repair part and test equipment costs.
- (3) Comparison of estimated savings to the anticipated breakout costs, and if the costs are greater than the savings, breakout is foregone.

The economic evaluation phase is difficult to adequately determine since a specific algorithm for computing costs and savings was not included in the original DAR legislation, nor has it been addressed in later updates (i.e., the Defense Federal Acquisition Regulation Supplement (DFARS).) This has resulted in each service determining a different version for their own uses. Steps 38-56 of Appendix G, illustrate the economic evaluation phase of breakout.

f. Supply Feedback Phase

This phase is the final screening for breakout parts. This phase is completed for all AMC 2 parts to determine if enough leadtime exists to breakout an item for the immediate buy requirement. It is illustrated by steps 57-65 in Appendix G.

The breakout program looks to the full screen review process to accomplish the bulk of the breakout action. The tradeoff is an expanded leadtime resulting from the technical reviews. Though these reviews should not impact supply support, there is the possibility of delaying budget execution due to the extra time necessary. The possibility of this is slight and, when viewed against the cost avoidances associated with breakout, the researcher views them to be negligible.

2. The Limited Screen Breakout Process

The second breakout procedure is a limited version of the full screen process and covers only the essential technical evaluations. The limited screen breakout process is constrained to 21 days, verses the maximum of up to one full year for a full screen breakout effort. [Ref. 8] Limited screen procedures are appropriate when the full screening process cannot be completed for a part in sufficient time to support an immediate buy requirement, [Ref 1:p. S6-304] Candidates for limited screen breakout are a result of weekly runs of UICP application A/O B10, Supply Demand Review (SDR). SDR determines those items which require procurement action within the apportionment year in order to support obligation.

The abbreviated format has 11 steps as compared to the 65 associated with the full screen process. The steps are followed sequentially and if a negative answer is

applicable to any of the questions, then the breakout review is terminated for the buy in question. However, once the urgent requirement has been met, a full screen review is accomplished on the item.

The following is the limited screen breakout process:

- (1) Step 1. Assemble the available data.
- (2) Step 2. Are full Government rights available to use the data?
- (3) Step 3. Is the data package sufficient, accurate and legible?
- (4) Step 4. Is the design stable for the item over the acquisition leadtime?
- (5) Step 5. Is a satisfactory part now being produced?
- (6) Step 6. Can the part be procured from a new source without qualification or other critical approval/testing?
- (7) Step 7. Can the Government or a new source be responsible for quality assurance?
- (8) Step 8. Can the part be manufactured without master or coordinated tooling or special testing equipment?
- (9) Step 9. If the answer to all of these questions is YES, then assign an AMC 2, and breakout the item on the pending procurement. Do not proceed with steps 10 and 11.
- (10) Step 10. If the answer is NO to any of these questions, assign an AMC of 3,4, or 5 as appropriate.
- (11) Step 11. Finally, establish a date for future review of the AMC 3,4, or 5 item, in an attempt to complete a full screen breakout.

Appendix H contains the limited screen decision breakout summary process.

The ultimate goal of the breakout review process is improvement in the acquisition method of an item. In general, breakout review actions will continue for an item until it is given an AMC/AMSC combination 1G, 2G, 1K, 2K, 1M, 2M, 1N, 2N, 1T or 2T. [Ref. 1:p. S6-203] An explanation of these combinations are contained in Appendix I.

E. TECHNICAL REVIEW PROCESS

The breakout technical review process, though similar in nature between the two ICPs, differs in practice at SPCC and ASO. This is the result of the level of breakout authority granted the two ICPs by their respective HSCs. NAVSEA, who does most of its business with SPCC, retains all breakout authority. NAVAIR and ASO have a more open working relationship, in that NAVAIR authorizes ASO to complete breakout action on 90% of the items managed by ASO without HSC approval.

1. The SPCC Technical Review Process

The breakout review effort at SPCC amounts to the candidate selection process. The output of the Stratification process is matched against a local FOCUS file containing the non-recurring demand requirements. This ensures that both recurring and non-recurring demand have been included in the listing of breakout candidates. This file is then scrubbed of all items which are not breakout worthy (i.e. items that are terminal, items transferring to

DLA management, items which are obsolete, combinations of family related items, etc.).

After this is completed, a final listing is generated and sorted by the appropriate ISEA, which will complete the actual breakout review. The various HSCs have prenegotiated annual breakout review package goals for each of their ISEAs. The overall success rate at SPCC is based on the cumulative success rates of the individual ISEAs. The SPCC annual goal for FY 1987 was 10,500 packages. [Ref. 9:p. IV-38]

Appendix L lists the FY 1987 breakout goals and completions by ISEA. The number of packages provided to the ISEA is significantly larger than the actual review goal. This allows the ISEA to choose which packages to review. [Ref. 10] While allowing the ISEAs flexibility in the scheduling of their workloads, this process could result in important breakout items being ignored from year to year.

SPCC breakout packages provided to the various ISEA include a breakout worksheet, several WSF retrievals (which contains necessary management data), and the required drawing package. The ISEA reviews the packages, performs an analysis, and returns the results of the review to SPCC. In most cases this is the last word on the breakout analysis. [Ref. 11] If the input data subsequently change significantly, then the package can be resubmitted to the ISEA for another screening.

The ISEA reviews increase the unit cost per breakout package because the expensive engineering review cost is applied to every item. If it were eliminated or reduced, then more candidates could be broken out.

2. The ASO Technical Review Process

The breakout review effort at ASO is a more balanced approach. Since NAVAIR authorizes ASO to breakout 90% of their items without a HSC review, ASO is able to breakout more items and at a lessor unit cost. The expensive HSC review cost is applied to only a small percentage of the breakout candidates and, when spread over the complete range of items, it only minimally increases the breakout review costs.

The ASO breakout goal for FY 1987 was to complete 12,500 screening actions. [Ref. 12:p. III-1] ASO uses a similar process for matching the Stratification output against a local breakout file in order to generate a clean listing. This listing is then reviewed and those items which appear to be the most promising candidates are processed for breakout review [Ref. 8] ASO uses the philosophy of [Ref. 12:p. II-3]:

. . . prioritization for screening [which] emphasizes high ABV, high buy quantities, and parts which can be purchased quickly.

Since it has in-house engineering talent, ASO has a freer choice of which items to pursue in order to satisfy their

annual review requirement. As a result ASO has been able to achieve a 51% success rate in breakout reviews. [Ref. 8]

3. Contractor Technical Information Coding (CTIC)

Many new equipment acquisition contracts require the inclusion of MIL-STD-789C ("Contractor Technical Information Coding of Replenishment Parts"). When called out in the Contract Data Requirements List (CDRL), this process requires the contractor submitting the PTD [Ref. 1:p. S6-400]:

(i.) to exert their best effort to make impartial technical evaluations using applicable technical data and the experience of competent personnel, and

(ii.) no costs to the Government will be incurred for duplicate screening of parts.

The information obtained via the CTIC process will be used by breakout personnel to determine the correct AMC/AMSC combination. Contractor recommendations should be considered as such. "Seldom will industry's contribution to the screening process enable the Government to assign an AMC without additional review." [Ref. 1:p. S6-302] Appendix M contains the acceptable contractor assigned technical codes.

The involvement of prime contractors in the breakout review process has been objected to by the National Tooling & Machining Association (NTMA) and the Small Business Administration (SBA). [Ref. 13:pp. 106, 113] The NTMA and SBA believe that an incestuous relationship exists between the big defense contractors and DOD procurement officials and that the two organizations work together to eliminate

competition vice fostering more of it. Reducing competition has a direct impact on the membership of NTMA and SBA organizations. Efforts are underway to review these claims. However, no conclusions have yet been reached.

NAVSEA has recently initiated a technical review process at the NAVSEA Logistics Center in Mechanicsburg, Pennsylvania to ensure accurate AMC/AMSC assignments during the initial provisioning process. This review process is rather simple in nature; a Government activity (NAVSEALOG) will perform the technical review and item coding which is currently accomplished by contractors under the CTIC process. The result will be an improved AMC/AMSC assignment without the bias described by the NTMA and SBA.

NAVSEALOG will review the technical data accompanying the PTD package and will supplement it with data from the SPCC library where necessary. [Ref. 34:p. 6] If adequate technical data are lacking then the item will be coded according (usually as noncompetitive.) Efforts to locate the missing technical data will not be included as part of this NAVSEA effort. [Ref.35]

NAVSEALOG has determined that it will be more cost effective to complete the AMC/AMSC coding in-house than it is to require contractors to complete the coding requirements. [Ref.35] By having a central Government activity complete the assignment process, a more consistent process should also result.

The only disadvantage in this process is the lack of data enhancement efforts. NAVSEALOG will work the technical package as is, but will not strive to improve it for breakout purposes. This is due to timing conflicts (i.e., a possible slowdown in provisioning could occur), and resource conflicts (i.e., the program is set up to do AMC/AMSC assignments, not complete breakout packages.)

Even as it is currently designed this program will improve the accuracy of AMC/AMSC assignments, however it should also be enlarged to include data enhancement measures.

F. MAJOR BREAKOUT CONCERNS

1. Technical Data

In March 1983, the Deputy Secretary of Defense sent a memorandum to the Service Secretaries pointing out that the lack of technical data to support reprourement from other than existing sources, is the principal factor inhibiting breakout. [Ref. 16] Technical data problems accounted for 62% of the breakout failures in fiscal year 1986. [Ref. 2:p. 13] Problems encountered with data include proprietary restrictions, inadequate data, lack of data due to nonprocurement during system acquisition, and data missing from data repositories. ASO reports additional problems with missing acceptance test requirements, missing master artwork and missing mylars (used for determining correct turbine blading pitch/design/thicknesses.) [Ref. 8]

Reverse engineering and bailment are two methods which can be used to counter this lack of technical data, but due to the expense involved, these methods are not universal cure-alls. Reverse engineering is the process by which parts are examined and analyzed to determine how they are manufactured, for the purposes of developing a complete technical data package including Level 3 drawings.

A related area which causes concern is the cost of procuring data, especially when related to a major system acquisition. Little research has been done to establish the intrinsic value of technical data, therefore one is left in a "seller's market" when determining the adequacy of technical data costs. [Ref.17:p. 1]

A second technical data issue relates to timing and receipt of technical data. A recent General Accounting Office (GAO) report indicated that the DOD was paying for data that it had ordered but, in fact, had not received. [Ref. 18:p. 1] This problem is a result of the confusion during contract initiation and review. The first problem deals with the contract data requirements being included in all of the appropriate levels of the contract (i.e., has the correct Data Item Description (DID) been called out, and is the data requirement specified in the CDRL.) Also of importance is the timing called out for the delivery of data procured in the contract. A common practice associated with equipment turnover is to require delivery of technical data

in concert with the delivery of the end item itself. This practice will usually result in delivery of accurate technical data, however it delays component provisioning and other required logistics activities.

A final technical data issue is the acceptance review of data that are received by the services. In many cases technical data are received and manually stored with only a cursory review for legibility. The true test for adequacy for use may not come for several years when the technical data are retrieved and reviewed for use in conjunction with a reprourement action. [Ref. 18:p. 39] At this time it is too late to correct the problem by requiring the contractor to develop new data.

2. NAVSUP Breakout Goals

A second concern in breakout is the measure of effectiveness currently used by NAVSUP to determine the success of the program. The Navy breakout program is currently working under DOD established competitive goals. NAVSUP has established the goal of 42% competition for the ICP's items. (This means that 42% of all procurement actions will be competitive versus sole-source.) Percentage goals as a measure of effectiveness can be considered useful, however the dollar value of contracts awarded competitively is a better measure of effectiveness. Additionally, in a practical sense, the average citizen can

relate to an annual dollar value for competitive savings more than a percentage of contracts awarded.

Another measure by which the ICPs are graded is the meeting of material obligations. This relates to obligating the material budget for spares procurement on time. Over the last few years it has been increasingly more difficult to simultaneously meet both the competitive percent goal and the budget obligation schedule.

Since breakout is a major driver in the competition process, the impact of which measure of effectiveness to use is an important consideration.

G. ANNUAL BUY VALUE (ABV)

The DAR Supplement No. 6 set the threshold of \$10,000 as the cutoff for breakout review action. The Supplement estimated that this figure represented the average cost to breakout an item. Therefore, any item with a lessor ABV would not be cost effective to pursue as a breakout candidate. [Annual Buy Value is the product of an item's unit procurement price and its forecasted annual demand quantity.]

The current Navy breakout method is tied to the Stratification process for the generation of potential breakout candidates. Using the UICP application A/O B20, a listing of all procurement buys for the budget year is generated. This is matched with a local FOCUS file to

create a computer listing of all ICP cognizance items having an ABV greater than \$10,000.

If an item has an ABV greater than \$10,000, then it is a prime candidate for breakout consideration. Those items will then begin a further review process to determine if they are breakout potential. This review, which is automated in nature will screen out those items which are terminal, obsolescent, transitioning to DLA management, or are already in the breakout pipeline without resolution yet. The screening action also ensures that non-recurring demand is added to recurring demand, to ensure that all planned program requirements are included in the ABV figures. [Ref. 11]

Since ABV is supposed to be the break-even point between the expected demand for an item, expressed as its annual value for procurement purposes, and the cost of the level of effort necessary to break out the item, the value at which it is set is crucial to determining which items are broken out. A better approach might be to eliminate the DOD ABV threshold, and determine a new level where breakout is cost-effective on a system basis.

In Fiscal Year 1987, NAVSUP lowered the ABV figure to \$5,000 for the two ICPs. The Fleet Material Support Office (FMSO) completed a study which illustrates that the break point for Navy management should be altered. The FMSO study indicated that the ABV for SPCC should be set at \$6,840 and

that the ABV for ASO should be set at \$5,800. The difference in the two values is due to:

- (1) A higher engineering review cost for the NAVSEA/SPAWAR material, managed by SPCC; [Ref. 19:p. 4]
- (2) A higher breakout success rate for aviation spares managed by ASO (60% success for aviation spares, vice 34% for non-aviation spares); and
- (3) A lower labor rate for aviation spares. [Ref. 20:p. 1]

The methodology used by FMSO was an iterative process of setting values for three parameters (labor costs, differential costs between competition and sole-source procurements, and First Article Testing costs), and then varying these parameters with different breakout success rates and different discount rates. [Ref. 19:p. 6] The process is one which can be readily used for conducting sensitivity analysis, given a range of possible input parameters. [Ref. 21]

The Air Force uses a very different approach to determine their ABV threshold. The Air Force ABV can be determined by one of three different methods, all of which tend to generate the same value. Appendix J details the Air Force approach to ABV determination.

Due to different input parameters and breakout review philosophies, the Air Force has as a drastically lower ABV than those given above for the Navy; namely \$2,130.

The major difference is due to the Air Force not including all of the breakout costs in their figures; just

the costs associated with that specific Air Force ICP. The situation would be similar if the Navy ICPs did not include the HSCs reviewing costs as part of their respective breakout figures.

Recomputed Navy ABV thresholds using the Air Force methodology for the ICP's part are [Ref. 22:p. 1]:

<u>ICP</u>	<u>CURRENT ABV</u>	<u>NEW ABV WITH AF MODEL</u>
ASO	\$5,800	\$6,367
SPCC	\$6,840	\$3,519

The Air Force model results in a higher ABV for ASO and a lower ABV for SPCC due to the HSC review cost differential. Appendix K includes the computations for ABV using the Air Force model. (Input values are derived from the FMSO ABV study.)

There is movement afoot to eliminate the DAR Supplement No. 6 determined ABV threshold completely, and allow each service to set the ABV at their respective ICPs. This would allow each service to set their own ABV based upon the unique breakout costs associated with each ICP. DOD has recently allowed the services to operate with independently set ABV values. This is a means to allow the services to determine and operate at their most economical level. To date no definitive guidance has been promulgated on this issue.

H. SUMMARY

This chapter discussed the provisioning and breakout processes currently used within the Navy. Provisioning is concerned with the identification of the subcomponents of a piece of equipment, such that an adequate range and depth of spares can be determined and procured. Breakout is concerned with the identification of the actual manufacturer or a second manufacturer of an item, such that price reductions can result on item reprocurments. An underlying requirement in both of these programs is the availability of adequate technical data. This concern was discussed as it applied to the two programs mentioned above.

Within the breakout process the limited screening and the full screening procedures were discussed, as was the annual buy value criteria used to determine breakout candidates. The technical data review process used for both provisioning and breakout was also covered. Finally, several major concerns with both of these processes were discussed.

In the following chapter, several breakout review models will be presented which try to quantify the costs associated with breakout. A uniform breakout model will be presented as an option to the currently used models within DOD. In Chapter IV, several of the major breakout and provisioning issues raised here will be discussed with some possible resolutions being presented.

III. BREAKOUT MODELS

In this chapter, three breakout models used by various DOD components will be reviewed and analyzed. The three models discussed include two Air Force models, ("The Competitive Acquisition and Breakout of Spares Model (CABS)" and the "Modern Technologies Model"), and a Navy model ("The NAVSEA Logistics Center Model"). The Army has not been active in the development of their own models, however research indicates that they are actively using the CABS model.

A new model is then proposed, called the "NAVICP Breakout Model." This model is a combination of the best features of the other models while providing a methodology which can be easily implemented by the practitioner at a Navy Inventory Control Point (ICP). This chapter concludes with a discussion of the proposed model.

A. THE CURRENT MODEL

The current "model" for breakout candidate determination comes from the economic analysis section of the DAR Supplement No. 6. The Supplement details several guidelines to consider in determining breakout candidates, but it does not provide a specific algorithm to follow. The procedure states simply that a comparison of breakout costs and estimated breakout savings is to be completed. If the costs outweigh the savings then the item should not be considered

as a breakout candidate; if the savings are greater than the breakout cost, then pursue the item until breakout is achieved. [Ref. 1:p. S6-303.5]

Costs are broken into two elements; direct costs and costs associated with the development of a performance specification. Direct costs are defined as those [Ref. 1:p S6-303.5]:

expenditures which are direct and wholly identifiable to a specific breakout action, and which are not reflected in the part unit price. Examples of direct costs include Government tooling or special test equipment, qualification testing, quality control expenses, and industry participation costs (such as completion of the Contractor Technical Information Data Record) if borne by the Government.

In the majority of cases, the only costs associated with breakout are those which fall into the direct cost category.

Performance specification costs are only associated with items for which the Government decides that it is advantageous to develop a performance specification, vice retain the item under a design specification. This is equivalent to a form, fit and function design. If the performance specification route is taken, a new item of supply may result which would require some type of additional provisioning action, cataloging action, and management cost associated with handling and procuring the newly introduced item. Thus, the costs associated with performance specification breakout may or may not be recurring. If a complete technical data package including Level III drawings were developed, then the costs would be

non-recurring. If a decision was made not to procure the technical data, then the performance specification costs could be recurring. In the latter case one may receive an item which has different repair parts and would have to be provisioned as a new item of supply when it is delivered to the Navy.

Breakout savings are determined by finding the product of the local savings factor (25% is the accepted DOD figure, but a local figure can be used if it is justified) and the remaining program or service life buy value for a part if it were broken out.

The original Navy breakout cost model (a result of the 1986 FMSO study mentioned in Chapter II) identified only three costs associated with breakout actions. These costs include a labor cost to review the breakout items, a First Article Testing (FAT) cost, and a procurement order cost defined as the difference between a sealed bid versus a negotiated buy. [Ref. 19:p. 2] In the FMSO study, labor costs were derived from the previous fiscal year labor rates; FAT costs were derived from estimates by the ICPs; and the order cost differential was derived by comparing the values from the Levels computations (UICP A/O D01) between negotiated procurement order costs and the sealed bid order costs.

The FMSO study assumed a five-year remaining service life, applied a 10% discount factor for the cost of money

over the five-year period as prescribed by DOD directives, and also included a 10% obsolescence factor for items leaving the inventory. The results of the study provided a range of values which could be considered as the ABV for the two Navy ICPs. The ranges were an ABV of \$5,478 to \$7,324 for ASO; and \$8,806 to \$12,999 for SPCC. The disparity between these proposed ABV figures reflects directly on the labor costs associated with breakout at the two ICPs. In particular, the HSCs have set rules on the final authority to determine a breakout item. SPCC must submit all breakout actions to the HSC (NAVSEA or SPAWAR) for their respective reviews prior to an item being broken out. This review increased the labor costs almost twelve-fold for SPCC cognizance items. ASO has the final breakout authority on approximately 90% of the items that it manages. Only flight critical items must be forwarded to the HSC (NAVAIR) for final review.

The labor costs used in the FMSO study follow:

<u>ICP</u>	<u>ICP COST</u>	<u>HSC COST</u>	<u>TOTAL COST</u>	<u>COST/ITEM</u>
ASO	\$7,061,679	\$ 459,910	\$ 7,521,589	\$1,176
SPCC	\$1,249,655	\$13,307,720	\$14,557,375	\$3,373

As is obvious from above, the HSC review costs dominate the SPCC labor costs.

A second FMSO study, conducted six months later in 1987, revised these ABV thresholds down to a range of \$7,100 to \$10,500 for SPCC and \$5,591 to \$6,957 for ASO. [Ref. 20:p.

5] These lower figures were attributed to a learning curve effect in the second year of breakout review, and to lower labor rates experienced at the ICPs. However, the two Navy ICPs are still operating under an ABV threshold of \$5,000, mandated by NAVSUP for fiscal year 1987.

B. THE COMPETITIVE ACQUISITION AND BREAKOUT OF SPARES MODEL

The CABS model was developed in 1983 by Analytics of Dayton, Ohio, as a result of an Air Force contract. The study separated the costs involved in breakout into the following three categories [Ref. 23:p. 22]:

- (1) Government non-recurring costs to break out a spare.
- (2) Government recurring costs to break out a spare.
- (3) Contractor non-recurring costs to become new source (to be applied only if identified and charged directly to the Government.)

The CABS model follows the basic logic:

$$\begin{aligned} \text{Net Savings} = & (\text{historical percentage of savings}) \times \\ & (\text{remaining program life buy value}) - \\ & (\text{summation of non-recurring and recurring} \\ & \text{costs associated with breakout}) \end{aligned}$$

The mathematical expression for the model and the definitions of its elements are listed in Table III-1. This model is an improvement over the DAR model in that it tries to quantify risks associated with contractor nonperformance. It also encompasses many of the specific breakout costs.

The CABS model has several drawbacks. It excludes a present-value analysis of the costs and benefits. It does

TABLE III-1

THE COMPETITIVE ACQUISITION AND BREAKOUT OF SPARES MODEL
(CABS) [Ref. 28:p. 7-3]

$$\text{Savings (S)} = (S_{\text{est}})(X_1) - \left[\sum_{i=1}^7 Y_i + \sum_{j=1}^8 Z_j + \sum_{k=1}^3 U_k + \sum_{m=1}^5 NV_m \right]$$

S_{est} = estimated savings from breakout value (\$/\$-year)

Costs Definitions

X_1	=	remaining expected program life-time buy quantity at current unit price (\$)
Y_1	=	cost of special tooling (Government transshipment) (\$)
Y_2	=	new source qualification (\$)
Y_3	=	reverse engineering (\$)
Y_4	=	initial data package verification (\$)
Y_5	=	purchase of data rights (\$)
Y_6	=	purchase of procurement data package (\$)
Y_7	=	First Article Test and inspection (\$)
U_1	=	production and test facilities billed to Government (\$)
U_2	=	qualification testing billed to Government (\$)
U_3	=	special tooling billed to the Government (\$)
N	=	number of nonstandard parts in a new performance specification item ($N = 0$ for design specification)
V_1	=	variable cataloging for nonstandard parts (\$)
V_2	=	bid opening for nonstandard parts (\$)
V_3	=	management for nonstandard parts (\$)
V_4	=	technical data for nonstandard parts (\$)
V_5	=	additional repair part and test equipment for nonstandard parts (\$)
Z_1	=	technical assistance (\$)
Z_2	=	product assurance (\$)
Z_3	=	risk of nonperformance (\$)
Z_4	=	risk of time-delay (\$)
Z_5	=	update and distribution of data packages (\$)
Z_6	=	data package verification (\$)
Z_7	=	solicitation preparation and evaluation (\$)
Z_8	=	contract administration and termination (\$)

not address item obsolescence. Finally, it requires the quantification of a great many factors, most of which are "soft." [Ref. 23:p. 22] The model is tedious to use at the piece part level.

The cost model may be useful when applied to a major component, but it is not very useful for analysis of breakout candidates. Additionally, the CABS model does not include the noneconomic benefits of breakout. It also ignores the potential for innovation resulting from competition, the need for a broader industrial base and the potential contribution to achievement of established competitive procurement goals. [Ref. 24:p. 27]

C. THE MODERN TECHNOLOGIES MODEL

The Air Force Business Research Management Center at Wright-Patterson AFB contracted with Modern Technologies, Inc. to develop a model which quantifies breakout and competition costs. The results were published in March of 1987.

As a consequence of the study, Modern Technologies noted that "a fundamental element of the problem lies in the unpredictable nature and magnitude of the savings and costs involved with competition initiatives on a specific part." [Ref. 25:p. 4] As a consequence, Modern Technologies tried to combine costs of competition with costs of breakout. The Modern Technologies model therefore assumed five major elements of breakout [Ref. 25:p. 12]:

- (1) Estimated savings over the expected remaining service life.
- (2) Government non-recurring costs for breakout to direct purchase.
- (3) Government recurring costs for breakout to direct purchase.
- (4) Government non-recurring costs for breakout to competition.
- (5) Government recurring costs for breakout for competition.

The structure of the Modern Technologies model follows
[Ref. 25:p 13]:

$$S = PXT - U - V - W - YT - ZT$$

where:

S = Expected reduction in cost (\$)

P = Expected percentage annual savings
(%/year)

X = Annual program buy value at current
price (\$)

T = Remaining annual program life of the part
(years)

U = Non-recurring cost for breakout (\$)

V = Costs associated with competition based
on a performance specification (\$)

W = Non-recurring cost for competition (\$)

Y = Recurring cost for breakout (\$/year)

Z = Recurring cost for competition (\$/year)

In this general structure, the following decision rules
apply:

- (1) If $S > 0$, then compete the item;
- (2) If $S < 0$, and $PXT > (U + YT)$, then breakout item;

- (3) If $S < 0$, and $PXT < (U + YT)$, then continue sole source procurement.

The mathematical expression and the definitions for the Modern Technologies model appear in Table III-2.

The Modern Technologies model is similar to the CABS model in regard to the data element definitions. In fact it could be argued that the two models are mirror images, but with a different numbering/lettering scheme. However, there is a difference between the two models. The Modern Technologies model includes a specific factor for non-recurring breakout costs, whereas the CABS model includes them as part of the base factors. The model also does not adequately resolve the issue of discounting of savings and benefits. The use of present value analysis, as required by DOD directives, is not evident in the Modern Technologies model.

The Modern Technologies model was designed for the Air Force to use at their Air Force Logistics Commands (AFLCs). Many of the elements specified by the model can easily be quantified at all of the AFLCs. Application of this model to Navy ICP use would be difficult because the Navy ICPs are not able to quantify some of the data elements in the model or to differentiate certain cost elements between breakout and nonbreakout situations. In addition, costs associated with purchase request generation, contract award, preaward survey, solicitation set preparation, bid opening, technical assistance, contract administration, additional bid

TABLE III-2

THE MODERN TECHNOLOGIES BREAKOUT MODEL
[Ref. 16:p. 22]

$$S = PXT - U - N \sum_{i=1}^4 V_i - \sum_{j=1}^6 W_j - T \sum_{k=1}^2 Y_k - T \sum_{m=1}^8 Z_m$$

Cost Definitions

P	=	expected percentage reduction in cost (\$/\$-year)
X	=	annual program buy value at current price (\$)
T	=	remaining annual program life of the part (years)
U	=	non-recurring cost for breakout (\$)
N	=	number of nonstandard parts resulting from performance specification (units)
V ₁	=	item entry for nonstandard part (\$)
V ₂	=	management of nonstandard part (\$)
V ₃	=	technical data for nonstandard part (\$)
V ₄	=	repair tools and test equipment for nonstandard part (\$)
W ₁	=	data package review and verification (\$)
W ₂	=	data rights purchase (\$)
W ₃	=	data package purchase (\$)
W ₄	=	First Article Test and inspection (\$)
W ₅	=	qualification test billed to the Government (\$)
W ₆	=	reverse engineering (\$)
Y ₁	=	purchase request preparation (\$)
Y ₂	=	contract award (\$)
Z ₁	=	special tooling transshipment (\$)
Z ₂	=	source approval (\$)
Z ₃	=	source development (\$)
Z ₄	=	solicitation sets (\$)
Z ₅	=	additional bid evaluation (\$)
Z ₆	=	pre-award surveys (\$)
Z ₇	=	technical assistance (\$)
Z ₈	=	contract administration (\$)

evaluation, and source development do not clearly seem appropriate for inclusion in a breakout model. These costs impact enhancement of competition, but should not be considered when determining breakout candidate selection.

D. THE NAVSEA LOGISTICS CENTER (NAVSEALOG) MODEL

The NAVSEA Logistics Center (NAVSEALOG) in Mechanicsburg, PA has developed a model for use in the economic evaluation of breakout items for which they are the In-Service Engineering Activity (ISEA). The process involves the use of a breakout worksheet and is rather involved in its completion. Table III-3 details the equations used by NAVSEALOG to determine the breakout savings associated with the life cycle of an item. The NAVSEALOG model considers six cost elements in determining breakout costs. These are [Ref. 26:p. 5-6]:

- (1) Visual and dimensional analysis which result in an adequate technical data package (TDP); assumes values ranging from \$150 to \$7000 depending on item complexity.
- (2) Drawing development costs required to develop the TDP; assumes a value of \$700 per drawing.
- (3) Material determination required to identify material composition and mechanical properties of the item; assumes a value of \$250 per component as guide.
- (4) Test specification determination to develop the performance parameters, acceptance criteria and test procedures for an item; assumes values ranging from \$500 to \$15,000 depending on the complexity of the item.
- (5) Possible item destruction if an item must be dis-assembled during reverse engineering in the

TABLE III-3

THE NAVSEALOGCEN BREAKOUT MODEL
[Ref. 17:p. 5-2]

$$\begin{aligned}
 S &= p(LCE_1 - RAV) \\
 RAV &= TRFI(LCE_1/N_1) + TNRFI(LCE_2/N_2) \\
 TRFI &= OH_1 + DI_1 - DO_1 - PR \\
 TNRFI &= (OH_2 + DI_2 - DO_2)(RSR) \\
 LCE_1 &= [N_1(P_1)(F_n)] - E \\
 LCE_2 &= (N_2)(P_2)(F_n) \\
 E &= (3N_1/n)(P_1)(F_3) \\
 F_n &= \frac{(1+i)1 + (1+i)2 + \dots + (1+i)n}{n} \\
 N_1 &= [QD - (RSR)(CRA)](4)(n) \\
 N_2 &= (RSR)(CRA)(4)(n)
 \end{aligned}$$

Cost Definitions

P_1	=	unit price of the item (DEN B055) (\$)
P_2	=	repair net price (DEN B059) (\$)
QD	=	quarterly system demand forecast (DEN B074) (units/quarter)
RSR	=	repair survival rate (DEN F009) (%/100)
CRA	=	system random maintenance carcass return average (DEN B022B) (units/quarter)
OH_1	=	on hand quantity (DEN A012 total) (units)
DI_1	=	internal due in (DEN A008B total) (units)
DO_1	=	internal due out (DEN A021A total) (units)
PR	=	total planned requirements (DEN A014) (units/year)
OH_2	=	on hand quantity (DEN A012 total less those where DEN C003E is H, J, K, or P) (units)
DI_2	=	internal due in (DEN A008A total) (units)
DO_2	=	internal due out (DEN A021A total) (units)
n	=	remaining service life of applicable ships (years)
p	=	savings factor = 0.25 (\$/\$-year)
i	=	estimated average inflation rate = 0.0616 devised from last ten years worth of Gross National Product Deflator (%/100)

TABLE III-3 (CONTINUED)

N_1	=	total number of new units required over the remaining service life (units)
N_2	=	estimated total number of carcasses returned to the supply system over the remaining service life. (units)
F_n	=	the factor when multiplied by the price, results in the average price over n years, adjusted for inflation.
E	=	the expenditures over expected time (estimated to be 3 years) to develop breakout item. (\$)
LCE_1	=	the total estimated life cycle expenditures for total number of new units required over remaining service life less the 3 year competition development period. (\$)
LCE_2	=	the total estimated expenditures for repaired units returned to the supply system (used only for repairable items.) (\$)
TRFI	=	the total number of uncommitted "Ready for Issue" assets currently in the supply system (units)
TNRFI	=	total number of uncommitted "Not Ready for Issue" assets in the supply system, that are expected to be returned to RFI condition. (units)
S	=	the life cycle savings for the subject item. (\$)
RAV	=	the residual value of assets held over the life of the part. (\$)

development of a TDP; the value would be the procurement cost of one item.

- (6) Management and logistics costs incurred in the review and the costs of file and management data associated with the development of full and open competition of the item of supply; estimated to be 15 percent of the summation of the above costs.

NAVSEALOG uses visual and dimension analysis, and/or reverse engineering as methods to produce the required technical data. The gross breakout costs are then multiplied by a three-year inflation factor. Finally, the difference between breakout costs and breakout savings is determined. Again, if savings are greater, the breakout of the item should be done.

The NAVSEALOG model takes into account two important factors missing in the previous models; namely, inflation and discounting of costs and benefits. Additionally, the model draws most of its data from existing information already in the Weapons Systems File (WSF), rather than having to derive it from a series of estimates.

NAVSEALOG developed cost element estimates from market surveys conducted with engineering firms engaged in the data generation process. [Ref. 27] These costs are based on categorizing breakout items into one of five complexity levels, which are assigned to directly equate to the level of effort required to work the breakout item. The levels of complexity are associated with generic types of equipments. For example, the simplest level of complexity, (Level 1) includes hoses, disks, nuts, tubes, wire; the medium level

of complexity, (Level 3) includes bearings, labyrinth packings, clutch shafts and shaft assemblies; and the most complex level, (Level 5) includes diesel engines, transmissions, and circuit breakers. [Ref. 26:p. 5-5]

The process could be improved if the categories were also identified by Federal Supply Class (FSC) or a combination of group and class. Research from the Air Force Institute of Technology provides evidence that there is a statistical relationship between the annual usage rate of an item and the item category of supply (i.e., the FSC). [Ref. 28:p. 53] A ranking of items based on item classification (i.e., by FSC) would also be useful in developing general guidelines, which could be used to assist ICP managers in their determination of whether to proceed with item breakout. ASO indicates that some such general guidelines are already being developed for turbine engine blade sets used on several Navy aircraft. [Ref. 8]

One area of confusion in this model is the Residual Asset Value (RAV) figure used in the breakout economic life cycle analysis. In theory, this element would seem necessary. However, in practice this seems to be a rather arbitrarily strict application of economic analysis. NAVSEALOG is trying to balance the breakout costs and breakout savings over the life of an item. For an adequate comparison NAVSEALOG has concluded that, at the end of an item's life, there would be a minimum number of the items

left over. The greater the amount of material that is on hand at the end of an item's life cycle, the lesser the savings value from breakout becomes. The amount of material left over at the end of an item's life is the function of the inventory management practices used by the ICP in managing the item.

RAV then is a function of inventory management practices. Breakout models are not designed to encompass inventory management practices. Breakout models instead use annual demand and item procurement value to determine breakout candidates; the inventory management policies are inconsequential to the consideration of breakout candidates.

It is assumed that competent inventory management practices will be used. These practices include using regenerated material out of the repair cycle as the prime source of spares as equipments are transitioned out of DOD; and also the deduction of procurement buys as demand decreases at the end of the equipment's life-cycle. When equipments are transitioned out of DOD, regenerated material is the prime source for equipments spares, not new procurements. When considering the phase-out practices of equipments within DOD, this strict matching principle seems inappropriate. For this reason the NAVSEALOG RAV figure is not deemed appropriate.

The NAVSEALOG model is the only one examined so far which considers planned program requirements (PPRs) as part

of the annual demand figure. However, the treatment of PPRs could be improved. The current model looks only to the currently registered PPRs, and not at the trend of the requirement for the particular item. Budget constraints restrict the establishment of PPRs to three years into the future. The breakout model should take into consideration the total number of PPRs which will be required, not just those presently established at the ICP. Future shipbuilding programs and equipment installation schedules should be readily available from the HSC program managers and the complete logistics information can usually be obtained from the respective program's logistic manager.

E. THE NAVICP BREAKOUT MODEL

1. Model Background

The previously mentioned models indicate the wide divergence within DOD concerning the breakout process. The Air Force and the Navy have developed models unique to their own needs. The wide range of research findings have revealed the many costs associated with breakout candidate review. A model which synthesizes the results of this body of research is developed in this section for application to the Navy ICPs. The application of this model to other services is not considered.

After a review of the available literature, the breakout model for the Navy ICPs should be based on the NAVSEALOG model. The CABS model includes many cost

variables, but it does not incorporate the required discounting factor made necessary due to the time differences between expenses and the stream of benefits. Both the CABS model and the Modern Technologies model encompass a great many cost variables which, for theoretical purposes, are correct but, for actual uses, are tedious and difficult to accurately quantify.

Any model chosen to represent breakout costs must be detailed enough to include all the pertinent factors. However, it must also be simple enough to be used by the practitioner. Determining this balance is at the heart of the model-building process.

2. Model Presentation

The NAVICP Breakout model makes use of the following major breakout elements:

- (1) Estimated savings over the expected remaining service life.
- (2) Government recurring costs to break out an item.
- (3) Government non-recurring costs to break out an item.

Table III-4 presents the mathematical equation and the definitions of the data elements.

This model contains the same data elements used in the previous models for the performance design breakout costs. However, it does eliminate the costs for competition, which the Modern Technologies model contains. The fact is that competition does cost more to maintain and,

TABLE III-4

THE NAVICP BREAKOUT MODEL

$$S = PT - U - \sum_{h=1}^7 W_h - m \sum_{j=1}^5 V_j$$

Implementing Equations:

$$N_1 = 4n(QD)$$

$$R_1 = \sum_{a=1}^n Z_a$$

$$F_n = \frac{(1+i)^1 + (1+i)^2 + \dots + (1+i)^n}{n}$$

$$N_2 = 4n(CRA)(RSR)$$

$$K = N_1 + R_1 - N_2$$

$$T = KF_n$$

Data Element Definitions:

S	=	net savings (\$)
p	=	ICP savings factor [DAR allows 0.25; SPCC actual 0.34; ASO actual 0.60] (\$/\$-year)
T	=	total estimated life cycle expenditures for total number of new units required over the life of the system (\$)
U	=	non-recurring costs for breakout (SPCC = \$2,174; ASO = \$869) (\$) [Ref. 8:p. 2]
N ₁	=	number of recurring demands over the remaining life time of the item (units)
N ₂	=	number of carcass returns over the life of the item (repairable only) (units)
R ₁	=	number of non-recurring demands over the life time of the item (units)
F _n	=	the factor when multiplied by the price, results in the average price over n years, adjusted for inflation
P	=	unit price [DEN B055] (\$)
K	=	total number of items required over the life time of an item (units)
m	=	number of new nonstandard items added as a result of performance specification breakout (units)
n	=	estimated life of the system (years) [Appendix N]
QD	=	quarterly system demand forecast [DEN B074] (units/quarter)

TABLE III-4 (CONTINUED)

i = estimated average inflation rate set at
0.0616, devised from last ten years average
of Gross National Product Deflator. [Appendix
N] (%/100)
RSR = repair survival rate [DEN F009] (%/100)
CRA = carcass return average [DEN B022B] (%/100)
Z = annual planned requirements [DEN A014]
(units/year)

Cost Identification:

Performance Costs

V₁ = item entry for nonstandard parts (\$636.20
for consumable; \$1299.53 for repairable)
[Ref. 25:p. 24] (\$)
V₂ = management cost for nonstandard part (\$448.00)
[Ref. 29] (\$)
V₃ = technical data for nonstandard part (\$5325
per package for an average package) [Ref.
30:p. 25] (\$)
V₄ = technical manual costs for nonstandard item
(\$500 per equipment) [Ref. 29] (\$)
V₅ = planned maintenance schedule costs for
nonstandard items (\$62.50 per part number)
[Ref. 29] (\$)

Breakout Costs [See Appendix N]

W₁ = visual and dimensional analysis (\$)
W₂ = drawing development (\$)
W₃ = material identification (\$)
W₄ = test specification determination (\$)
W₅ = possible destruction of one item (\$)
W₆ = technical management cost (\$)
W₇ = reverse engineering cost (\$)

Note: If reverse engineering is used, then the
other breakout costs should be set to zero,
since reverse engineering will provide a
complete technical data package.

Decision Rules:

If S > 0, Conduct breakout.
If S < 0, Do not conduct breakout.

if it is an element of the model, then the decision to breakout an item would always be negative. For this reason, costs to continue an item in competition should not be included in a model to determine breakout candidates.

The NAVICP Breakout model also contains the time value calculations and breakout cost estimations used in the NAVSEALOG model. The NAVSEALOG cost estimates are the best of the previously mentioned models. However, two changes have been made. The NAVICP Breakout model includes a cost parameter for reverse engineering (if that method is expected to be used to obtain the technical data) and it reduces the value for the technical management review parameter from 15% to 10% of total breakout cost. This parameter is reduced, since many of the costs that make up this variable are picked up in the "Non-recurring cost for breakout parameter," which appears separately in the model.

Currently the ABV calculation and the economic analysis calculations are two distinct processes. In reality the two calculations should be included in the same equation. The model therefore includes a labor factor parameter (variable U) for breakout review which includes costs associated with the ABV determination/review process. It is still necessary to include an ABV variable in the model since it represents that fixed level of work necessary to complete a breakout candidate review. The work associated with this variable does not appear in any other

parameter, therefore it is best left as a separate variable.

The Navy ABV labor factor was derived by FMSO. The factor used in the NAVICP Breakout model includes only the labor portion of three of the five variables used in the FMSO factor. The First Article Testing cost element and the contract differential cost are not included separately. First Article Testing costs are included in the "test specifications determination" data element (W_4) under breakout costs. The contract differential costs are not included in the model because they are (1) negligible in value, and (2) should correctly be considered as costs of competition rather than costs of breakout.

Performance cost considerations are included in the NAVICP Breakout model although the ICPs have not considered them in the past. These costs are related to form, fit and function design. If performance specifications are used, a change to the system life parameter (n) might be necessary. Any new item developed via a performance specification should have the same service life as the item it is replacing. If this is not the case, then the value for system life requires revising.

The NAVICP Breakout model separates the future demand into its two components; recurring demand (N_1) and non-recurring demand (R_1). The values for these two data elements are readily available from the WSF. In most cases the value for recurring demand in the WSF can generally be

assumed to be accurate. The only exception would be in cases of a WSF error, or a major shift in the demand trend which is not yet visible in the quarterly demand forecasting value.

The value for non-recurring demand may not be accurate in the WSF. Other management data may be available to program managers which is not visible in the WSF and which would indicate a greatly different value. Causes for the difference would be expected sales to foreign governments, overhaul schedules for ships and their equipments which are not visible via a planned requirement, and new construction outfitting/delivery schedules experiencing an increasing population growth which is not yet reflected in increased failure rates. All of these situations would result in a value much higher than the one resident in the WSF. Therefore program management attention is necessary to ensure these unique cases are included in the breakout analysis.

The NAVICP Breakout model simplifies the calculations required in the breakout savings determination. The total dollar value of new items required over the life of the system (T) is multiplied by the savings parameter and the result is the breakout savings. This approach to the breakout savings determination is considered to be accurate enough. The NAVSEALOG model estimates the residual asset value (RAV) and uses it in the final breakout determination.

However, as mentioned previously, the use of RAV is tedious and it does not provide a reasonable breakout savings value.

The proposed model also ensures that the carcass regeneration rates for repairable items are considered. This is necessary to ensure that the total life-time requirement is not overstated by counting all demands as new procurements when most will be satisfied by repair actions. This methodology is included in the NAVSEALOG model but it is not a consideration in the CABS or Modern Technologies models.

The breakout savings parameter (p) can be set at one of two values. The DAR Supplement No. 6 allows for use of "either a savings factor of 25% or one determined under local conditions and experience." [Ref. 1:p. S6-303.5] The ICPs have demonstrated breakout success rates in excess of the 25% bench mark, therefore those rates should be applied. The 34% rate for SPCC and the 60% rate for ASO are the values used by FMSO in their latest study (1987), and they are considered acceptable for this breakout model's use.

3. Benefits of the NAVICP Breakout model

The NAVICP Breakout model is considered an improvement over the other models examined for several reasons. Most importantly, it combines the ABV process with the economic analysis process. This combination reduces the current time-consuming manual process of screening all the items from the Stratification output review against an ABV

value (at whatever value one sets it), and then rescreening all the breakout candidates again during the economic analysis portion of breakout. The two steps are combined into one, and a great deal of duplicative work can be eliminated. The savings in the workload can allow a wider range of items to be screened for breakout review action.

The automated data storage requirements for this model are minimal since the majority of the data elements are currently resident in the WSF. This reduces the number of separate data files and unique breakout data elements necessary in order to accomplish breakout. As the number of unique breakout data requirements increases, so do the costs associated with operating and maintaining the database.

The NAVICP Breakout model could easily be integrated into the local breakout files currently existing at each ICP. The programming effort required to computerize the model is considered minimal. By computerizing the model, obvious additional cost savings could be accrued.

Another benefit of this model is the flexibility in regard to planned program requirements. It is estimated that non-recurring demand accounts for the greatest volume in many weapon systems' inventory spares procurements. [Ref. 9] If the WSF values for planned program requirements are accurate enough, then one can use them for the economic analysis. However, the NAVICP Breakout model allows for the flexibility of manipulating the PPR values in order to

obtain the correct value for non-recurring demand. The NAVICP Breakout model allows for an update of this parameter when it is necessary, whereas this is not possible in the previously discussed models.

The NAVICP Breakout model considers the time value of money in its calculations. This is a critical consideration since the timing of the savings, and the incursion of costs associated with those savings are disjointed over time. Discounting is necessary to correct for the time value of money and also to account for inflationary effects. The CABS and Modern Technologies models do not consider this critical aspect.

The methodology of the NAVICP Breakout model is rather simple when compared to previous models. This simplicity makes the model more attractive to those who are required to use it. The computation which determines the breakout savings is straightforward, and accounts for both recurring and non-recurring demand. The parameters used to determine the breakout costs account for the variables which have the greatest impact on breakout candidate selections. Values for use in the parameters are as accurate as the information in the WSF. This simplicity would make personnel training and computerization of the model rather simple. Because of its simplicity, people should find it easy to understand and use correctly.

In conclusion, the NAVICP Breakout model combines and summarizes those important parameters which impact on the breakout process. It synthesizes the essence of breakout and reduces the breakout problem to several parameters which have been quantified or are easily determined. The NAVICP Breakout model is considered the best model to use for application at the Navy ICPs.

F. SUMMARY

Three breakout models which are used within the DOD were presented and discussed. The major data elements and sources of data for these models were also discussed and reviewed for adequacy. A proposed model for use at the Navy ICPs was presented. This model, called the "NAVICP Breakout" model, is a synthesis of the previously mentioned models, and contains the positive aspects of each. Each of the cost elements in the model are discussed. The NAVICP Breakout model is a simple model which uses readily available data, and accurately reflects those costs elements inherent in the Navy breakout process.

IV. RELATED PROVISIONING-BREAKOUT ISSUES

Throughout the research devoted to developing the NAVICP Breakout model, many other breakout issues became evident. These issues are not central to the parameters in the breakout model, however they are considered germane to the breakout issue in general and are worthy of discussion here.

A. TIMING OF TECHNICAL DATA PROCUREMENT

The provisioning process is the one centralized effort given to new equipments entering the Navy inventory to ensure the correct configuration and supply support. To do this, thorough technical reviews are necessary using contractor furnished technical data. The timing for provisioning is such that it usually occurs approximately one year prior to equipment deliveries to the fleet. However, this time frame varies depending upon the sophistication of the equipment and the unique requirements of the specific Provisioning Requirements Statement (PRS) associated with the particular equipment contract.

Subsequent to provisioning, the life-cycle management approach is one of "management by exception." Unless something drastically wrong develops with the APL, or the equipment is undergoing a major change in maintenance philosophy, the original provisioning is not revisited. Ongoing APL maintenance does occur, where stock numbers are

updated or allowances changed, but these are minor when compared to a reprovisioning effort where the APL is basically reworked. For example, a recent reprovisioning effort at SPCC involved more than 12,000 APLs and began in 1984. This effort is intended to correct maintenance philosophy changes and to allow the APLs to be used for depot-level maintenance, in addition to the organizational and intermediate levels. The extent of the effort is major and will take several years to complete. [Ref. 31]

As has been mentioned previously, the availability of technical data is the one factor which ultimately will determine if a breakout action will be successful or not. This fact has been emphasized by several recent studies completed by the Services. [Ref. 6:p. 1-3; Ref. 7:p. 4-1; Ref. 32:p. 117] Technical data for breakout is usually difficult to obtain or acquire since the breakout process occurs at a time long past the provisioning period. This can be up to 10 years past the original provisioning date, but it averages approximately six years. After a period of six years, obtaining data due under the original contract but not provided or lost is very difficult and usually very expensive to accomplish. In many cases the data are just not available any longer, even from the original vendor.

The provisioning process and the breakout process both require the indepth technical review of data in an attempt to make a decision concerning a supply management action.

In provisioning, the actions will determine the management of the item and inventory control/stocking policies. In breakout, the actions will determine whether the item will be broken out to a second source. These two processes use the same data and can be accomplished by the same technical level of worker.

Therefore, the provisioning process is the ideal time to complete the data requirements for breakout determination. Both Navy ICPs have taken steps to integrate certain breakout actions into the provisioning process (e.g., assigning AMC/AMSC combinations, completing DD Form 1423, etc.). However, the technical data acquisition is still left until a future date. The premise is that an item may never pass the ABV threshold for breakout consideration, therefore it will not be necessary to ever procure the technical data.

This may be a sound management decision, however additional research is necessary. Using the four past years of history of breakout candidate selection and success, an analysis should be conducted to determine if breakout success can be correlated to item category or to group and class combinations (e.g., FSC.) The outcome of such an effort would give management personnel an idea of probable breakout success groups based on past performance. Items which have higher breakout potential would be better ones to obtain additional technical data on, whereas items with low

breakout success might not warrant any additional breakout effort at all.

B. EQUIPMENT LEVEL BREAKOUT REVIEW

The current breakout process is concentrated at reviewing items at the NSN level. It involves developing technical packages at the item level. However, the screening and data package preparation efforts are repetitive in nature. Linked with the fact that the technical data is the same for items on the same piece of equipment; one can then achieve a labor reduction by processing a group of items together vice just processing the numerous individual items singularly.

If all the items of a complete equipment or component (e.g., a motor, pump or air compressor) were screened for breakout action, the items would fall along some sort of continuum from highly successful breakout candidates to ones which should never be screened for breakout action. In between these two extremes would be a wide range of items where breakout action is marginal. These marginal candidates would become positive candidates if one or more of the breakout costs to process the item were reduced or eliminated. If breakout items were grouped by equipments, one could reduce the per item cost to screen the items and therefore bring the marginal candidates into a positive breakout status.

A breakout initiative at SPCC is under way in which several equipments were reviewed at the equipment level for determining breakout candidates. [Ref. 33] The outcome of this approach looks very promising, in that breakout rates have been consistently higher than the general breakout rate. The final results of this initiative are not yet available, however the approach appears to work.

Manufacturers tend to be more amenable to providing technical data if approached at an equipment level once, vice being approached several times over the course of a year for technical data on individual items. [Ref. 29] In most cases the technical data are very similar for all the items in an individual equipment, and if the Government is approaching manufacturers individually it could be paying twice for the same data.

The Competition Advocates at the two Navy ICPs indicated that certain manufacturers are quite willing to cooperate with breakout efforts, while others are not as interested. These cooperative vendors are more willing to provide technical data than the others. ASO is even linked via computer to the data files of several of the prime aircraft contractors (e.g., Pratt & Whitney, Lockheed, Sikorsky, Rolls-Royce, and Grumman to name only a few). [Ref. 8] The emphasis should be to group items at the equipment level and then approach the responsible manufacturer for the required

technical data. Those manufacturers who are more willing to supply data should be approached first.

In the past the Navy ICPs have been both equipment and weapon systems oriented. Now both are being organized strongly around the major weapon systems they support. The program management, inventory management, and provisioning will all operate on a systems perspective. With the expertise being aligned in this manner, it would seem logical to operate breakout in a similar manner.

C. TECHNICAL DATA STORAGE

A GAO study indicates that the Services are not getting all the technical data that they have paid for and that, for data they do obtain, they are not doing a thorough enough job screening it for accuracy and completeness. [Ref. 18:p. 1] Because ICPs have a great need for accurate and complete data, the careful screening of the data needs to be accomplished when received. Data receipt is the only time when the contractor can be held accountable for inadequate or missing technical data. If data are missing or not in accordance with the CDRL, immediate feedback to the contractor is necessary.

A major issue to be resolved is the receipt and review of technical data. Data are still being received in microfilm and in hardcopy format. In order to integrate new electronic data storage measures, system acquisition contracts must incorporate data receipt via digitized format

within the CDRLs and PRSSs. Additionally, more resources are required to check contractor input against CDRL requirements to ensure that all the necessary technical data are being received. For this effort to be achieved, technical screening at the ICPs and at the field contract administration offices (i.e., at the SUPSHIPS and NAVPROs) must be improved.

The technical data issue will plague the breakout effort until better methods evolve to not only procure, but also to store, validate and maintain as updated, the vast amount of technical data required to continue the breakout process. A major Navy initiative is the Engineering Data Management Information and Control System (EDMICS), an automated data storage and retrieval system.

EDMICS is designed to provide state-of-the-art management information to 36 Navy and four DLA engineering data repositories. [Ref. 2:p. 15] The existing inventory of hardcopy and microfilm drawings will be scanned, digitized and permanently stored on optical disks. This system will greatly improve the retrieval aspects of data management between ICPs and field engineering activities.

The Navy is also actively engaged in the development of the Navy Standard Information System (NTIS), a data communications architecture and data exchanges standards for application in computer-aided logistics support. The NTIS project, in conjunction with EDMICS, will provide an update

to the technical data handling system which would be equal to that of the leaders in the industry.

D. INTANGIBLE ASPECTS OF BREAKOUT

A last important aspect of the breakout process which needs emphasis is the consideration of intangible aspects of the breakout process. Many occasions exist where the results of the strict breakout economic analysis indicate that a negative breakout decision should be made. However, this strict view does not consider the political environment of the breakout process, which may indicate that an item should be broken out even if the economic analysis is negative. Even though this decision process cannot be easily aided by a quantifiable data element, it warrants active consideration when breakout decisions are being made.

An example would be the procurement of technical data from a sole-source prime contractor with which the Government has a history of pricing problems. If the technical data can be obtained by the Government then future procurements problems could be eliminated via the competition process. If the economic analysis of the item is positive, the item will become a prime candidate for breakout action. If the economic analysis is negative, it would not be considered for breakout action. However, in this case the pricing issue is more important than the economic one, and breakout should be accomplished.

E. SUMMARY

Four topics related to breakout have been presented and discussed which impact on the breakout process. The timing of technical data procurement, the application of breakout reviews at the equipment level, the technical data storage problem and the intangible aspects of breakout are all issues pertinent to the breakout process. However, they are not quantifiable in any model form. These issues were the result of the literature reviewed and the interviews conducted while working on the proposed breakout model.

V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The following summary, conclusions and recommendations are presented as a result of this study.

A. SUMMARY

The background of the breakout program and the provisioning process used at the Navy Inventory Control Points were reviewed. The major issues and concerns associated with these two processes were analyzed in an effort to determine the groundwork common to both of them. The research indicates that these two processes are related most notably in the requirement for technical data. Problems associated with technical data and its procurement were also discussed and reviewed.

Three breakout models used within DOD were reviewed and analyzed. The object of this review was to determine the cost elements associated with breakout that have been quantified by the other Services. This review culminated in the identification of those costs which would most accurately describe breakout for the Navy's Inventory Control Points. These data elements were then incorporated into a new model called the NAVICP Breakout Model. The NAVICP Breakout model, its input parameters and its benefits were then discussed indepth.

The final chapter reviewed several breakout related issues which became evident as a result of the research. These include timing of technical data procurement for breakout and provisioning, equipment level breakout, data storage, and intangible aspects of breakout. Resolution of these issues are necessary in order to improve the breakout process.

B. CONCLUSIONS

Conclusion No. 1. The current breakout process has worked basically the same since its inception in 1983, with the publication of DAR Supplement No. 6. The corporate knowledge has grown since that time, and better breakout processes have been discovered. It is time that some of that knowledge be applied to improving the DOD-wide breakout methodology. This involves combining the breakout process with the provisioning process in order to prevent unnecessary duplicative item review actions, while improving the procurement of technical data.

Conclusion No. 2. Several models have been developed for determining breakout candidates. Although the models contain data necessary for academic purposes, their application to real-world situations is difficult to do. Using these models in the "real world" can result in better screening, but at a reduced processing rate, and at a higher cost per item screened. A model which captures the data

mechanically, and which can accomplish the tedious analysis automatically is needed.

Conclusion No. 3. The breakout process is very difficult to administer and track. The process has many players, not all of whom are actively interested in the process. SPCC has a very difficult time in the area of technical review since all breakout candidates must be approved by NAVSEA. NAVAIR has allowed ASO a freer hand in the process, and therefore ASO has been able to apply some innovative breakout techniques. In order to improve on the breakout program, uniform policy and goals for all of the breakout players is necessary.

Conclusion No. 4. The current process for "counting" breakout candidates should be revamped, and clearly determined between all the breakout players. Currently the ICPs and the ISEAs are graded on the number of breakout reviews completed. However, NAVSUP controls the ICPs by also requiring a specific success rate. In contrast, the ISEAs which work for NAVSEA and not NAVSUP, are only assigned a goal to review a certain number of breakout packages. These goals only require the completion of a certain number of breakout reviews; they do not require a specific success rate. Because of this it is therefore possible that an ISEA could complete all of its assigned breakout reviews, but have a zero percent breakout rate.

This phenomenon currently occurs at several ISEAs supporting SPCC.

Conclusion No. 5. The breakout philosophy should be applied at the complete equipment level, and not just to the individual NSN level. The potential for breakout exists for many items which by themselves currently do not meet the economic threshold for breakout. The pioneer work at SPCC indicates that this is an area which will bear much fruit. The research on determining the feasibility of FSC correlation and annual usage rate should also be further explored.

Conclusion No. 6. Technical data procurement is the most difficult part of the breakout process. The success of breakout rests on the availability of technical data. The best time to procure technical data is when the contractor is contractually bound to provide it as part of an equipment contract. Provisioning Technical Data (PTD) receipt is the best time to catch incorrect, missing and incomplete technical data.

Conclusion No. 7. Better technical data management is also necessary in order to store the data that are collected. The Navy's automated technical data storage and retrieval system (EDMICS) needs to be expanded and brought on line at the ICPs. This system could greatly aid the technical data handling requirements of the breakout

program, in addition to aiding in the many other ICP functions which rely heavily upon technical data.

Conclusion No. 8. NAVSEA should provide SPCC with the authority to make breakout decisions, in the similar manner that NAVAIR has provided ASO with breakout authority on noncritical items. This would require a better working relationship between SPCC and NAVSEA, and also require that SPCC increase its staff of qualified engineering personnel. If this were done, the cost of reviewing SPCC breakout candidates would decrease. This would allow items with a lessor ABV threshold to be reviewed. The decrease in breakout review costs would also have positive effects on the breakout success rates.

C. RECOMMENDATIONS

Recommendation No. 1. It is recommended that the NAVICP Breakout model be implemented at the Navy Inventory Control Points for use in breakout candidate determination. This model combines the annual buy value calculation with the breakout economic computation, and it will simplify the overall breakout analysis.

Recommendation No. 2. In regard to the NAVICP Breakout model, additional analysis should be done to compute a range of values for the non-recurring cost for breakout parameter (i.e. the U parameter) based on equipment complexity. This would allow for a tailored range of labor values that would more closely correspond to the actual labor cost needed to

breakout the equipment. This fine-tuning effort could improve the breakout program success rate by allowing for a closer look at lower cost items.

Recommendation No. 3. It is recommended that breakout goals be universal for all of the breakout players. A more realistic approach might be a goal to breakout a specific dollar amount per year, or to establish a specific breakout percentage at each In-Service Engineering Activity. This approach would stimulate the technical activities to undertake a more thorough breakout review methodology.

Recommendation No. 4. Technical data received from contractors by ICPs requires better screening and it must be more closely checked against the CDRLs for data appropriateness and completeness. This requires both indepth screening at the ICPs and also better control by the field contract administrative organizations (i.e., the SUPSHIPS, NAVPROs, etc.). If technical data is not corrected at the time of receipt, then recouping the lost information at a later time is usually not possible.

Recommendation No. 5. Breakout planning needs to be considered during the acquisition planning and concept evaluation phases of weapon systems acquisition. Decisions on technical data procurement and life-cycle support must include breakout consideration.

Recommendation No. 6. Items coded AMSC K, M, and N should not be automatically rejected from breakout

consideration. The current level of manufacturing technology should reduce the number of items being assigned these restrictive codes.

D. AREAS FOR FUTURE RESEARCH

An area for further research would be an investigation of the feasibility of incorporating breakout information on the Lead APLs used by the ICPs during the provisioning process. Additional research should also be done on the issues discussed in Chapter IV.

APPENDIX A

INTERVIEW QUESTIONS

1. What areas are the most successes coming in? Are there specific systems, manufacturers, platforms, systems or components that have been easier to breakout than others?
2. Are items reviewed at the system/equipment level or are they accomplished at the NSN level only? Have any system level reviews been done? What have the results been?
3. What are the top dozen (or so) "hard nut" equipments, manufacturers, or systems that have been the most difficult to get any successful breakout candidates from? What are the specific reasons for the problems?
4. What systems or equipments would create the greatest breakout success if it were possible to break them out? [i.e., What equipments (systems) currently not broken out would be the one with the greatest benefits if it were to be successfully broken out? What is keeping it from happening?]
5. What is the process used from initial candidate identification to the successful completion of the breakout process? [i.e., Do you have a flow-chart that details the breakout process?]
6. Do you have any figures which detail the average length of time required to complete the various steps in the breakout process?
7. What are the various factors (criteria) used to determine if an item is a breakout candidate (i.e., AMC coding alone, AMSC plus AMC coding, etc.)?
8. What is the accuracy of the AMC and AMSC codes in the WSF in regard to their use in determining breakout candidates? (i.e., Are they only 75% accurate, better worse, better for some items, worse for others.)
9. What is the most difficult aspect of the breakout process?

10. How long is the approval process from the HSC on breakout items? Does it vary between consumable and repairable items?
11. Is the breakout process different between consumable and repairable items? Which is easiest to do? What cogs are the hardest to breakout and why? Which are the easiest and why?
12. Are there different criteria between consumable and repairable items?
13. What outside help (outside of your breakout group/division/section) is necessary to complete breakout of an item (i.e., contacting support, program office support, ADP support, etc.)?
14. What starts the breakout process (i.e., just the STRAT process or is there something else tied to it)?
15. What is the track record of breakout at your command in regard to its success? I'm looking for some more quantitative info than just the bottom-line stuff that NAVSUP publishes in their Annual Report, if you have it available.
16. What data in the WSF is used for breakout (i.e., What DENS are required to be complete in order to do a full-screen breakout? What DENS are required for a limited-screen breakout, if different? How accurate is the information in these DENS? Are there any specific DENS which are problem areas in regard to accuracy?)?
17. Since breakout's institutionalization at your command, what has been the annual average cost to breakout an item? Are there any stats available by year broken down by COG or SMIC? (I'm trying to get a feel if the cost to breakout an item is increasing in cost per item within cog or smic.)
18. Are there any unique breakout techniques or "discoveries" that you have found during the breakout process that are worthy of note (i.e., the ASO computerized database, etc.)?
19. Is breakout getting more difficult or easier to accomplish? What do you see are the reasons driving this? What actions would be the greatest help to you in aiding to improve your breakout successes (a wish-list question)?

20. What is the level of support that your HSCs provide to you in breakout accomplishment? What could they do to improve on the current situation?
21. What is the average number of days to complete a breakout package, and to get it improved by the HSC? (Please breakout it down by COG or SMIC if available.) Is the trend increasing, decreasing or remaining constant?
22. In regard to the ALRAND Working Memo 525 of Dec 1986. . . . What is the trend on failure items being rescreened? (Is the size of the body of failure to screen items on the increase, decrease or remaining constant? I'm trying to determine if any trends exist, on items which are failures to screen one year and subsequently successfully screened the next.) Do you have a listing of several years worth of failure to screen items?
23. What are the maximum number of full-screen reviews that can be completed each year? What is the rate per person? Will the staff increase in the near future?
24. Are the number of breakout candidates increasing or decreasing each year? With the "better" data rights requirements being incorporated into new contracts by DOD, the pool of candidates should be decreasing. Is this phenomenon being observed?
25. Is the data for new items in fact better then the data for older items (i.e., Is the information accompanying newly provisioned items more accurate and of better quality than items from the data of 5 years ago? Of 2 years ago? I'm trying to determine if any of the DOD initiatives to get better rights data up front is appearing yet in the WSF)?
26. What automated database system does SPCC use to automate the breakout process? What are the inputs to the database? How often is it updated? How effective is the use of the system?
27. What is the current FY87 projected breakout rate? What was last year's breakout rate?
28. Do you see any problems or inaccuracies in the ALRAND study of Dec 1986? If so what are they?
29. How successful is the "Competition Advocate Buy Requirements Listing" in generating breakout items? Is it an SPCC initiative or something out of NAVSUP?

30. What is the objective of Bailment? Is it for vendors to develop Technical Data Packages for the government procurement activities? How cost-effective is it? Any major results or examples of its success? What is the expected cost avoidance of the program? What is the pool of candidates and how often is it determined (i.e., annually? more often?)?

APPENDIX B

ACQUISITION METHOD CODES (AMC)

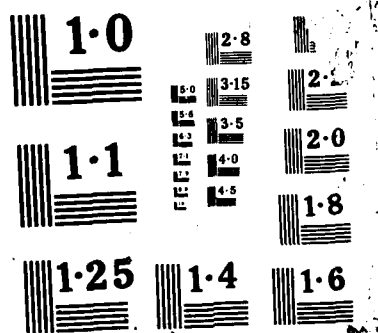
[Ref. 1:p. S6-201.1]

<u>AMC</u>	<u>EXPLANATION</u>
1	Item screened and suitable for competitive acquisition.
2	Item screened and suitable for competitive acquisition for the first time.
3	Acquire, for the second or subsequent time, directly from the actual manufacturer; whether or not the prime contractor is the actual manufacturer.
4	Acquire, for the first time, directly from the actual manufacturer; whether or not the prime contractor is the actual manufacturer.
5	Acquire directly from the prime contractor even though the engineering data identify the Federal Supply Code for Manufacturers (FSCM) and the part number from a source other than the prime contractor.

2/2

NL

[illegible]



APPENDIX C

ACQUISITION METHOD SUFFIX CODE (AMSC)

[Ref. 1:p. S6-201.2]

<u>AMSC</u>	<u>EXPLANATION</u>
A	The Government's rights to use data in its possession is questionable.
B	Acquisition of the part is restricted to sources specified on "Source Control," "Altered Item" or "Selected Item" drawings/documents.
C	The part requires engineering source approval by the design control activity in order to maintain the quality of the part.
D	Not used.
E	Not used.
F	Not used.
G	The Government has unlimited rights to the technical data, and the data package is complete.
H	The Government physically does not have in its possession sufficient, accurate or legible data to purchase the part from other than current sources.
J	Not used.
K	The part must be produced from class 1A castings (e.g., class 1 of MIL-C-6021) and similar type forgings.
L	The annual buy value of this part falls below the screening threshold of \$10,000 but it has been screened for known sources.

M Master or coordinated tooling is required to produce this part; which is not owned or available from the Government.

N The part requires special test and/or inspection facilities to determine and maintain ultraprecision quality for its function or system integrity.

P The rights to use the data needed to purchase the part from additional sources are not owned by the Government and cannot be purchased.

Q Not used.

R The data or the rights to use the data needed to purchase the part from additional sources are not owned by the Government, and it has been determined that it is uneconomical to purchase them.

S Not used.

T Acquisition of the part is controlled by QPL procedures.

U The cost to the Government to breakout the part and acquire it competitively has been determined to exceed the projected savings over the life span of the part.

V The part has been designated a high reliability part under a formal reliability program. Probability of failure would be unacceptable from the standpoint of safety of personnel and/or equipment.

W Not used.

Y Design of the part is unstable.

Z Not used.

APPENDIX D

ACQUISITION METHOD/SUFFIX CODE CORRELATION TABLE

[Ref. 1:p. S6-33]

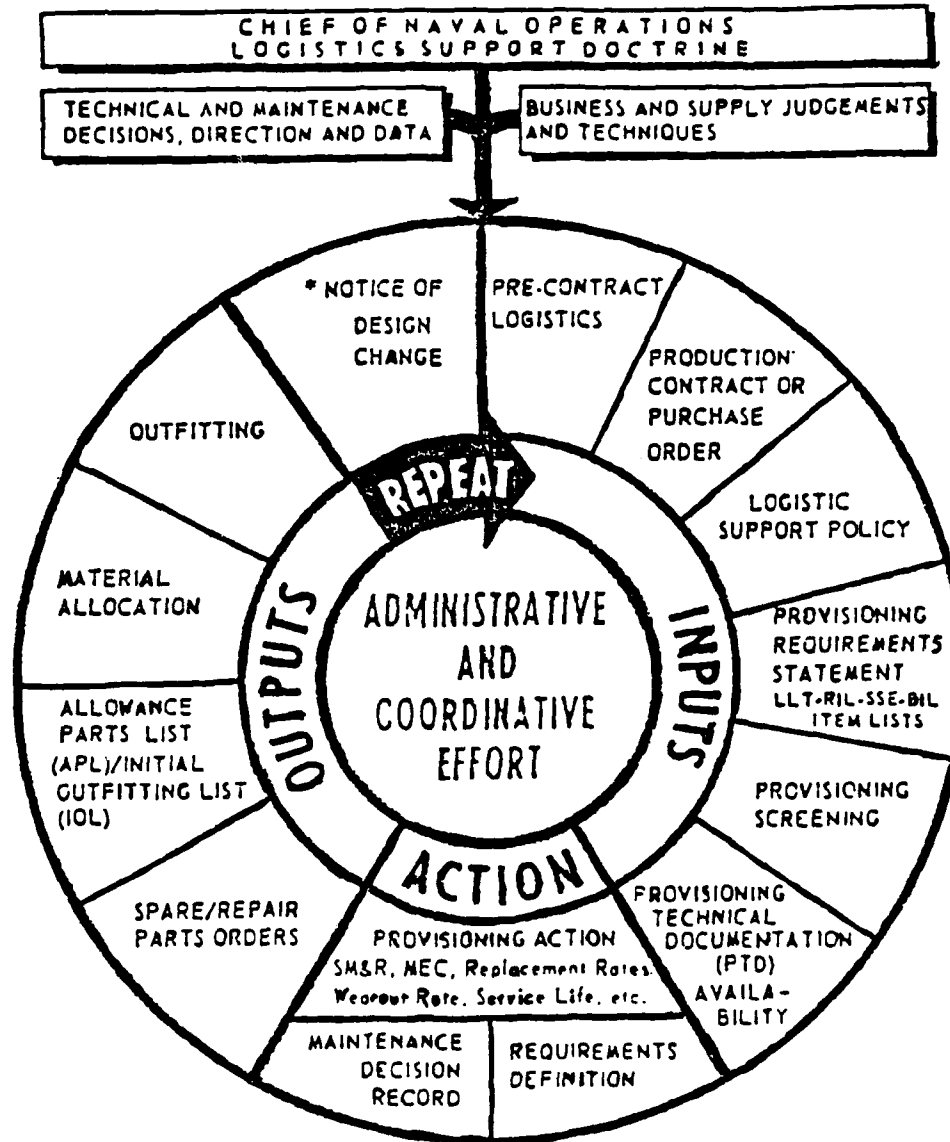
AMSC AMC	A	B	C	G	H	K	L	M	N	P	R	T	U	V	Y
1	●	●	●	●	●	●	●	●	●	●	●	●			
2	●	●	●	●	●	●	●	●	●	●	●	●			
3	●	●	●		●		●	●		●	●		●	●	●
4	●	●	●		●		●	●		●	●		●	●	●
5	●				●		●			●	●		●	●	●

NOTE: Those blocks indicated by a dot are valid combinations of Acquisition Method Code (AMC) and Acquisition Method Suffix Code (AMSC.) As an example, the combination of AMC 1 and AMSC Y is invalid. This combination would indicate that it is acceptable to obtain competition of an item that is design unstable.

APPENDIX E

THE PROVISIONING PROCESS

[Ref. 34:p. 2-6-04]



* Design changes are considered part of the initial provisioning cycle. When a design change to an item is approved, the provisioning cycle recommences.

APPENDIX F

PROVISIONING REFERENCE DOCUMENTS

[Ref. 4:p. 5]

Hardware Systems Commands (HSC) required documents for equipment support and provisioning:

Military Standards

MIL-STD-12	Abbreviations for use on Drawings, Specifications, Standards and in Technical Type Publications
DOD-STD-100	Engineering Drawings Practices
MIL-STD-789C	Contractor Technical Information Coding of Replenishment Parts
MIL-STD-1388-1A	Logistic Support Analysis
MIL-STD-1388-2A	Logistics Support Analysis Record (LSAR) Requirements
MIL-STD-1561B	Uniform DOD Provisioning Procedures

Military Specifications

DOD-D-1000	Drawings, Engineering and Associated Lists
MIL-C-9877	Cards, Aperture
MIL-F-7024	Fluids, Calibrating, for Aircraft Fuel System Components
MIL-M-9868	Microfilming of Engineering Documents 35MM, Requirements for

Federal Manuals/Catalogs/Standards

FED-STD-5	General Pattern Standard
H4-1	Federal Supply Code for Manufacturers, Name to Code

H4-2	Federal Supply Code for Manufacturers, Code to Name
H6-1	Federal Item Name Directory for Supply Cataloging
H6-2	Federal Handbook of Pattern Descriptions

Data Item Descriptions (DIDs)

DI-E-20477C	Imaged Aperture/Tabulating Card
DI-L-7166	Packaging Requirements Data Report
DI-P-7128	Contractor Technical Information Coding of Replenishment Parts
DI-P-7129	Technical Data Identification Check List
DI-V-5431	Provisioning Performance Schedule
DI-V-7000A	Supplementary Provisioning Technical Documentation (SPTD)
DI-V-7001A	Manufacturer's Commercial Manual (Provisioning)
DI-V-7002A	Provisioning Parts List (PPL)
DI-V-7007A	Tools and Test Equipment (TTEL)
DI-V-7008A	Common and Bulk Items List (CBIL)
DI-V-7009A	Design Change Notice (DCN)
DI-V-7010	Item Logistics Data Record (ILDR)
DI-V-7016F	Provisioning and Other Preprocurement Screening Data
DI-V-7192	System Configuration Provisioning List (SCPL)
DI-V-7193	Provisioning Parts List Index (SPLI)
DI-V-7196	Statement of Prior Submission (SPS)

Other Documents

DAR Supplement No. 6	Defense Acquisition Regulations (formerly ASPR), now part of the Federal Acquisition Regulations (FAR)
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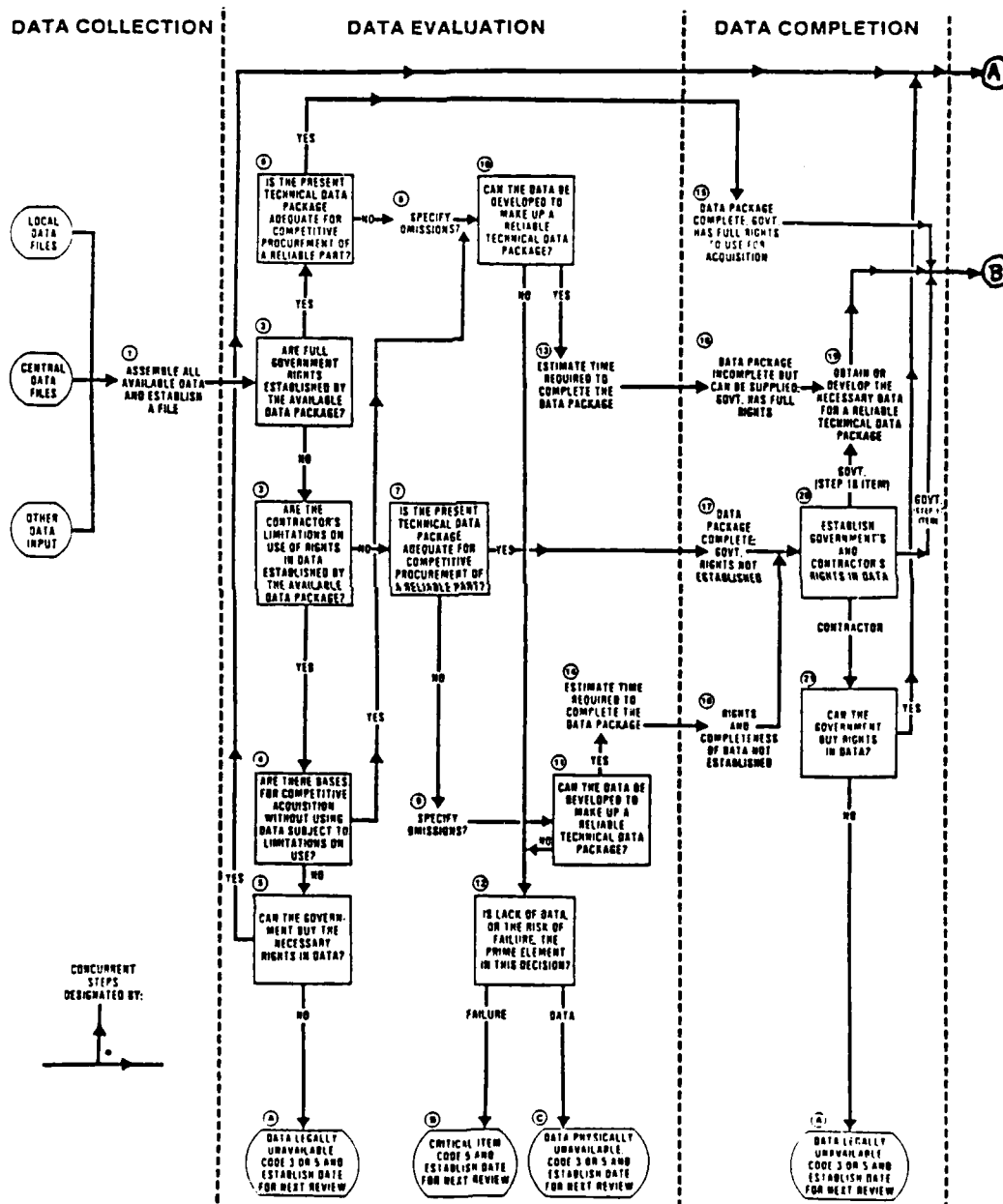
DOD 4100.38M	DOD Provisioning and Other Preprocurement Screening Manual
FAR	Federal Acquisition Regulations
NAVSUPINST 4423.14B	Naval Material Command (NMC) Uniform Source, Maintenance and Recoverability (SM&R) Codes
SPCCINST 4441.170	Coordinated Shipboard Allowance List (COSAL) Use and Maintenance Manual

Industry Documents

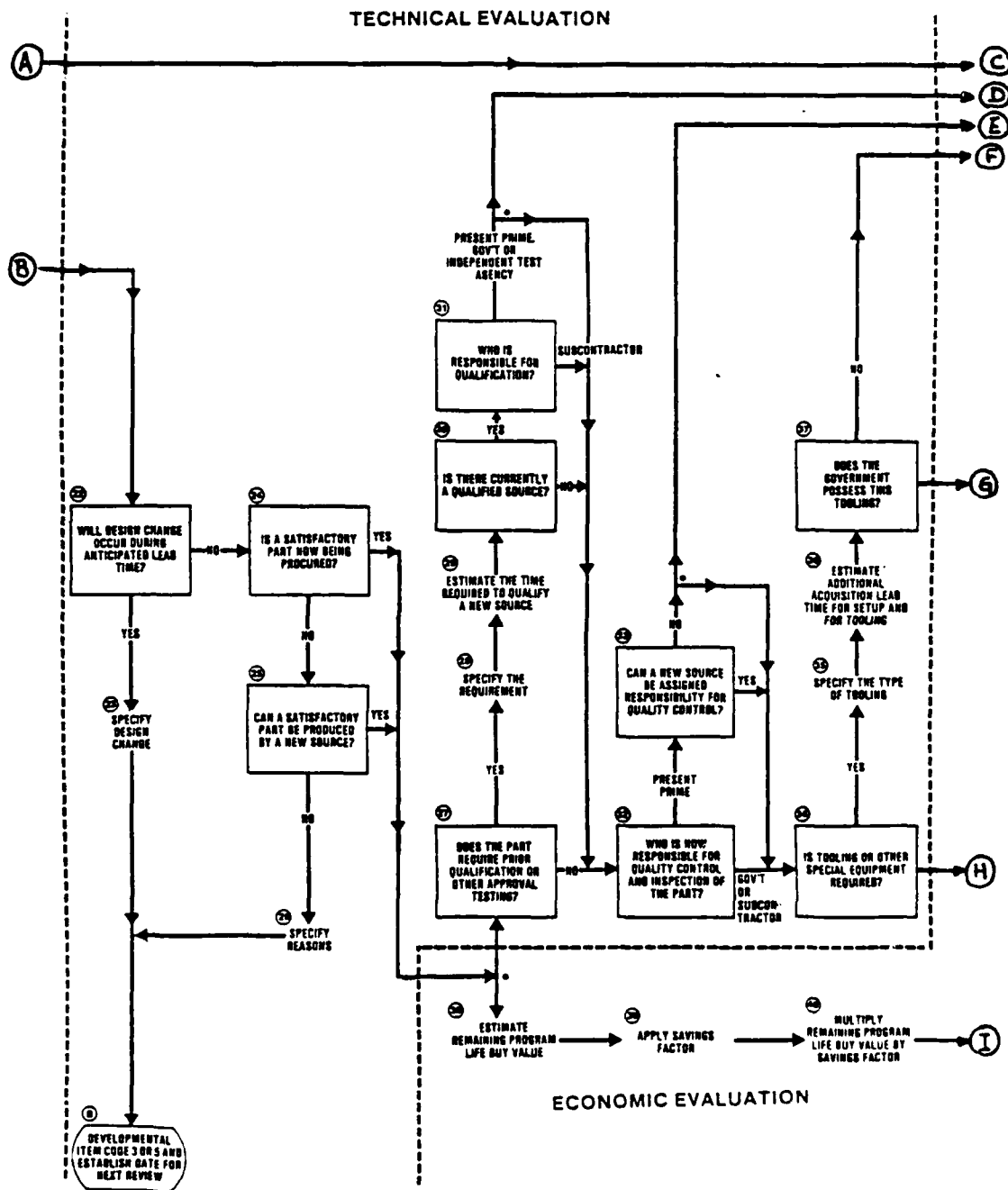
ANSI Y 32.16	Reference Designations for Electrical and Electronics Parts and Equipments
ANSI Y 32.2	Electrical and Electronics Diagrams, Graphic and Symbols

APPENDIX G

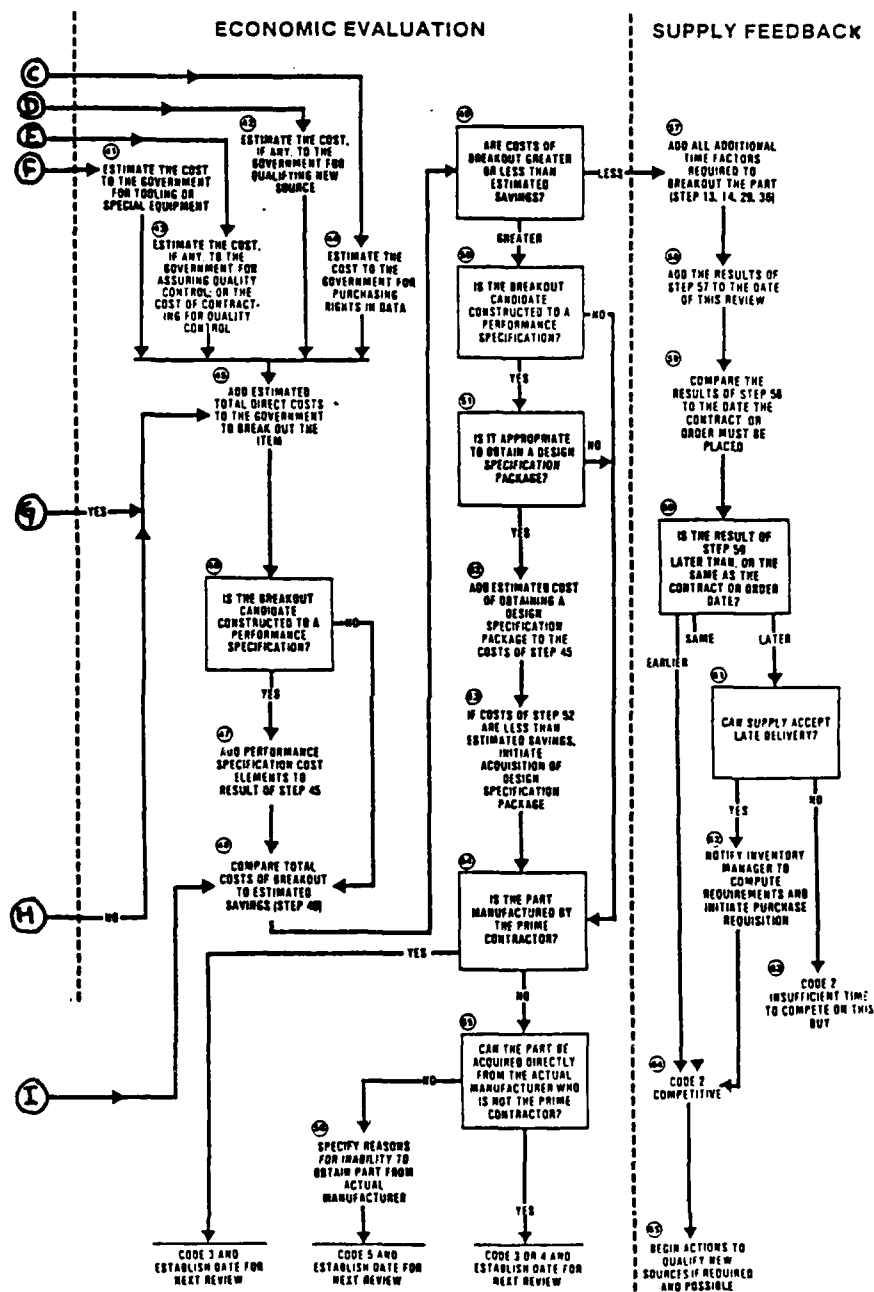
REPLENISHMENT PARTS BREAKOUT PROGRAM FULL SCREENING DECISION PROCESS SUMMARY FLOW CHART [Ref. 1:p. S6:35]



CONTINUATION OF REPLENISHMENT PARTS BREAKOUT PROGRAM
FULL SCREENING DECISION PROCESS SUMMARY FLOW CHART



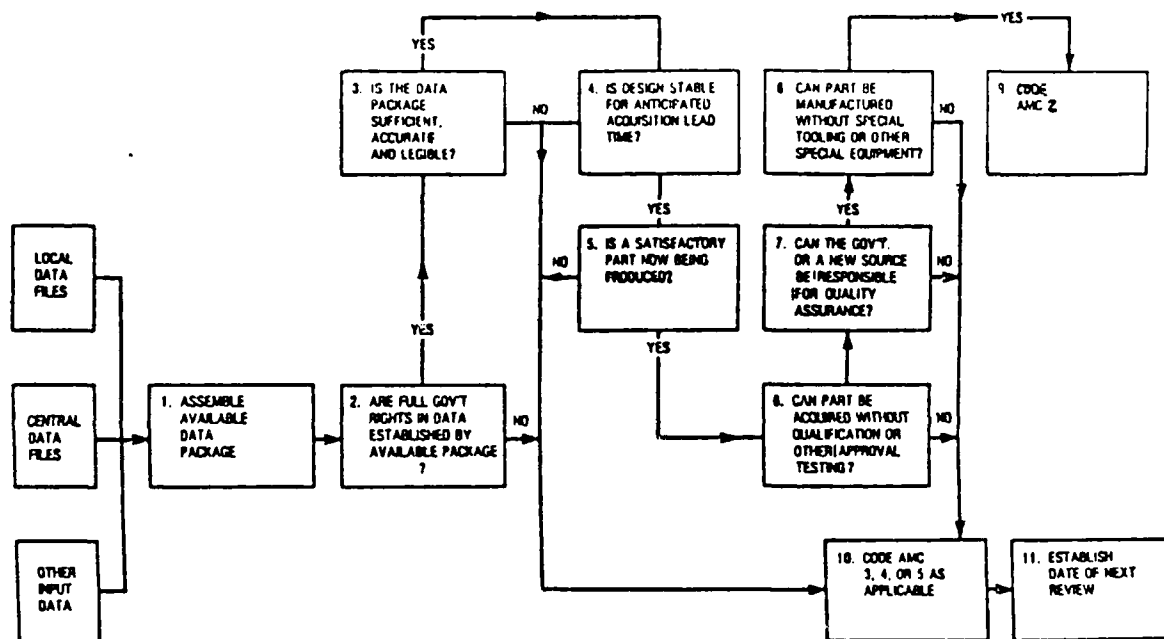
CONTINUATION OF REPLEMISHMENT PARTS BREAKOUT PROGRAM
FULL SCREENING DECISION PROCESS SUMMARY FLOW CHART



APPENDIX H

REPLENISHMENT PARTS BREAKOUT PROGRAM LIMITED SCREENING DECISION PROCESS SUMMARY FLOW CHART

[Ref. 1:p. S6:37]



APPENDIX I

BREAKOUT IMPROVEMENT EFFORTS

[Ref. 1:p. S6-203]

Breakout efforts will continue for the life of a part or until such time as the part is coded as follows:

<u>AMC/AMSC</u>	<u>EXPLANATION</u>
1G	Item suitable for competitive acquisition; the Government possesses complete data and unlimited rights.
2G	Item suitable for competitive acquisition for the first time; the Government possesses complete data with unlimited rights.
1K	Item suitable for competitive acquisition, but a source capable of producing Class 1A castings is required.
2K	Item suitable for competitive acquisition for the first time, but a source capable of producing Class 1A castings is required.
1M	Item suitable for competitive acquisition, but master tooling is required.
2M	Item suitable for competitive acquisition for the first time, but master tooling is required.
1N	Item suitable for competitive acquisition, but special testing is required.
2N	Item suitable for competitive acquisition for the first time, but special testing is required.
1T	Item suitable for competitive acquisition, but item is controlled by a Qualified Producers List (QPL).

2T

Item suitable for competitive
acquisition for the first time, but item
is controlled by a QPL.

APPENDIX J

AIR FORCE APPROACH TO ABV DETERMINATION

[Ref. 11]

The three approaches to determining Air Force ABV are provided as follows:

METHOD 1: For use when manpower is not a data element.

$$ABV = \frac{c + ab + fF}{aP}$$

where: (c + ab) = cost to process a Form 761 (Air Force breakout form)
fF = First Article Testing costs
c = average cost per screening that does not yield AMC 1, 2 [c = \$80 actual]
a = fraction of screened actions resulting in breakout (AMC 1,2) [a = 0.28]
b = average additional cost per screening that yields AMC 1,2 [b = \$220 actual]
f = fraction of screened items receiving first article testing [f = 0.08 actual]
F = average cost per first article test [F = \$590 actual]
P = average fraction of ABV saved by competitive procurement [P = 0.35]
ABV = annual buy value

METHOD 2: For use when manpower is a data element.

$$ABV = \frac{NS + X}{BCD}$$

where: N = number of people (including all support people [N = 48 actual]
S = average annual salary of N [S = \$28,886 actual use GS 11/05]
X = total cost for developing a bidders package [X = \$189,594 per year]
B = number of items screened per year [B = 8464 actual]
C = fraction of screened items that result in competitive buy [C = 0.28 actual]

D = fraction of savings on competitive buy
[D = 0.35 actual]

METHOD 3: The quick-cut approach.

$$ABV = \frac{A + B + 5C + 5D}{5SF}$$

where: A = AFLC Form 761 processing cost [A = \$75]
B = first article testing cost [B = \$448]
C = competitive solicitation/award differential [C = \$111]
D = competitive solicitation bid set preparation and mailing [D = \$309]
SF = savings factor [SF = 0.25]

In method 3, the C, D, and SF factors were multiplied by 5 in order to determine a five year average.

Via these three methods, the ABV is determined to be:

Method 1:	\$1926
Method 2:	\$1900
Method 3:	\$2130

APPENDIX K

NAVY ABV COMPUTATIONS USING AIR FORCE METHODOLOGY

Method 1 is used to determine Navy ABVs with the Air Force model.

$$\text{Given:} \quad \text{ABV} = \frac{(c + ab) + fF}{aP}$$

where, $(c + ab)$ = cost per item to complete breakout
 fF = cost per item for First Article Testing (FAT)
 a = breakout success rate [SPCC = 0.34, ASO = 0.60]
 P = average fraction saved through breakout [SPCC = ASO = 0.31]

Assumption from the FMSO study: FAT would cost \$200 per test and apply to 40% of the items.

$$\text{ASO:} \quad (c + ab) = \frac{\$7,061,679}{6,395} = \$1,104.25$$

$$fF = \frac{(\$200)(.40)(6,395)}{6,395} = \$80$$

$$\text{therefore:} \quad \text{ABV} = \frac{(\$1,104.25) + (\$80)}{(.60)(.31)} = \$6,366.94$$

$$\text{ABV(ASO)} = \underline{\underline{\$6,367}}$$

$$\text{SPCC:} \quad (c + ab) = \frac{\$1,249,655}{4,316} = \$389.54$$

$$fF = \frac{(\$200)(.40)(4,316)}{4,316} = \$80$$

$$\text{therefore:} \quad \text{ABV} = \frac{(\$389.54) + (\$80)}{(.31)(.34)} = \$3,506$$

$$\text{ABV(SPCC)} = \underline{\underline{\$3,506}}$$

The values for c, a, b, f, F, and P are all provided by FMSO study. [Ref. 19]

APPENDIX L

FY 1987 SPCC BREAKOUT SUCCESS GOALS/RATES BY ISEA [Ref. 35]

The following is the breakout success goals and achieved rates of breakout success for SPCC in FY 1987.

COGNIZANT TECHNICAL ACTIVITY	FY1987 GOAL	FY1987 COMPLETION	SUCCESS RATE
NAVSEA 06			
NWSC CRANE	100	70	35.7%
NOSC SAN DIEGO	25	59	89.8%
NWSC EARLE	NA	0	NA
NCSC PORT HUENEME	1100	1033	43.9%
NCSC ST. INIGOES	100	94	80.9%
NOS INDIAN HEAD	50	11	100.0%
NOS LOUISVILLE	350	401	59.4%
NUSC NEW LONDON	NA	47	36.2%
NCSC NORFOLK	2000	1187	31.3%
NUSC NEWPORT	250	254	44.5%
NUSC KEYPORT	175	207	64.7%
NADC WARMINSTER	100	94	0.0%
NWSC YORKTOWN	50	56	0.0%
NAVSESS PHILADELPHIA	NA	3	100.0%
NAVSEA 05	3100	2396	16.3%
NAVSEA 08	NA	395	75.2%
NAVAIR	280	258	18.2%
SPAWAR	1480	772	15.4%
TOTAL	9160	7337	
SPCC GOAL	<u>10500</u>	<u>10507</u> **	
DIFFERENCE	1340*	3170**	

*This difference is accounted for by completing technical referrals, which are easier than breakout actions but are counted the same as one.

**This was actually made up by technical referrals and DLA inquiries. SPCC actually completed 10507 breakout screenings with a success rate of 29.6% for FY 1987.

APPENDIX M

CONTRACTOR TECHNICAL INFORMATION CODES

[Ref. 1:p. S6-201.3]

Contractors shall use the following codes when MIL-STD-789C is invoked in the CDRL:

<u>CTIC</u>	<u>EXPLANATION</u>
CB	Source controlled item in accordance with "source control", "altered item" or "selected item" drawing/document. [The contractor shall furnish a list of the sources with this code.]
CC	Engineering source approval required by the design control activity in order to maintain the quality of the part. An alternate source must qualify in accordance with the design control activity's procedures.
CG	No technical restrictions exist to competition.
CK	Item produced with Class 1A castings or similar type forgings. Development and use of high-integrity castings is required. [The contractor shall furnish a list of known sources for obtaining castings and forgings with this code.]
CM	Master or coordinated tooling is required to produce this item. [The contractor shall furnish a list of the firms possessing the master or coordinated tooling with this code.]
CN	This item requires special test or inspection to determine and maintain ultra-precision quality for function or system integrity. [The contractor shall furnish a list of the required facilities and their location with this code.]

- CP The rights to use the data needed to purchase this part from additional sources are not owned by the Government and cannot be purchased.
- CV A critical part or high reliability part under a formal reliability program. Failure of this part would be unacceptable from the standpoint of safety of personnel or equipment. Continued control by the existing source is necessary to ensure acceptable reliability. [The contractor shall identify the existing source with this code.]
- CY The part is design unstable. Configuration design, manufacturing or performance changes in this part are anticipated. [The contractor shall identify the existing source with this code.]

APPENDIX N

VALUES FOR NAVICP BREAKOUT MODEL PARAMETERS

[Ref. 26:p. 1-5]

Values for F_n determined via the following equation:

$$F_n = \frac{(1+i)1 + (1+i)2 + \dots + (1+i)n}{n}$$

This is the factor which when multiplied by the price, results in the average price over n years. Values for F_n for $n = 1$ through $n = 48$ are given below. [Ref. 36:p. 9]

Note: $i = 0.0616$ used for calculation for average price factor.

n	F_n	n	F_n	n	F_n	n	F_n
1	1.062	13	1.558	25	2.383	37	3.788
2	1.094	14	1.612	26	2.473	38	3.943
3	1.128	15	1.667	27	2.568	39	4.106
4	1.164	16	1.726	28	2.667	40	4.276
5	1.201	17	1.787	29	2.770	41	4.455
6	1.239	18	1.851	30	2.878	42	4.642
7	1.279	19	1.917	31	2.991	43	4.838
8	1.321	20	1.986	32	3.109	44	5.043
9	1.354	21	2.059	33	3.232	45	5.249
10	1.410	22	2.135	34	3.362	46	5.484
11	1.457	23	2.214	35	3.497	47	5.721
12	1.508	24	2.296	36	3.639	48	5.969

Breakout costs:

The system complexity table used in W_1 and W_4 cost determinations follows:

COMPLEXITY LEVEL EXAMPLES

LEVEL	DESCRIPTION	EXAMPLES
1	Simple	hose, bar round, disk, seal, weight, nut, tube, CO ₂ cylinders, wire

2		spacers, inlet duct, coupling, cylinder liner, tee tube, check valve, vane spacer
3	Middle	bearings, labyrinth packing assembly, garbage disposal, control rudder, generator, clutch, shaft assembly double-sided circuit card assembly
4		valve, gear unit, power supply, rotor assembly, proximity switch, antenna mast, pump, multi-layer circuit card assembly
5	Complex	diesel engines, photo electric controller, transmission, fairing assembly, circuit breaker

Note: If the item under review does not appear as one of the examples listed, the level of complexity shall be assigned as deemed appropriate by the reviewer.

W₁: Visual and Dimension Analysis.

Level 1	=	\$ 150
Level 2	=	\$ 900
Level 3	=	\$ 2000
Level 4	=	\$ 3750
Level 5	=	\$ 7000

Note: Costs for visual and dimensional analysis for parts which do not fit into one of the above complexity levels, should be estimated using the above table as a guide.

W₂: Drawings Development. Use \$700 per each required drawing as a guide.

W₃: Material Specifications. Use \$250 per component as a guide.

W₄: Test Specification Determination.

Level 1	=	\$ 500
Level 2	=	\$ 1500
Level 3	=	\$ 3000
Level 4	=	\$ 7000
Level 5	=	\$15000

Note: Costs for test specifications for parts which do not fit into one of the above complexity levels, should be estimated using the above as a guide.

W₅: Possible Destruction of One Part. Use the replacement cost available from WSF (DEN B055).

W₆: Technical Management Cost. Technical costs should be estimated to be 10% of the sum of W₁ through W₅.

W₇: Reverse Engineering. If reverse engineering is used for breakout, estimate the cost at \$25,000 per item; and consider all other costs as zero.

Average Remaining Service Life (n) for Economic Analysis.

<u>Ship Class</u>	<u>n</u>
SUBMARINES	
Ohio Class (SSBN 726-749)	29
Benjamin Franklin & Lafayette Classes (SSBN 616-659)	9
Los Angeles Class (SSN 688-773)	27
Glenard P. Lipscomb (SSN 685)	18
Narwhal (SSN 671)	13
Sturgeon Class (SSN 637-687)	14
Ethan Allen Class (SSN 609-618)	6
George Washington Class (SSN 598-601)	4
Permit Class (SSN 594-621)	9
Tullibee (SSN 597)	4
Skipjack Class (SSN 585-592)	5
Skate Class (SSN 578-584)	2
Barbel Class (SS 580-582)	3
Dolphin Class (AGSS 555)	12
AIRCRAFT CARRIERS	
Nimitz Class (CVN 68-75)	40
Enterprise Class (CVN 65)	20
Kitty Hawk & John F. Kennedy Class (CV 63-67)	23
Forrestal Class (CV 59-62)	11
Midway CLASS (CV 41 & 43)	5
Intrepid Class (CV 31 & 34)	5
Modernized Essex Class (CVS 12 & 20)	3
LARGE COMBATANTS	
Iowa Class Battleship (BB 61-64)	15
Virginia Class (CGN 38-41)	22
California Class (CGN 36 & 37)	19
Truxton Class (CGN 35)	11
Bainbridge Class (CGN 25)	6
Long Beach Class (CGN 9)	5
Ticonderoga Class (CG 47-70)	30

Belknap Class (CG 26-34)	10
Leahy Class (CG 16-24)	7

DESTROYERS

Arleigh Burke Class (DDG 50)	35
Kidd Class (DDG 993-996)	25
Coontz Class (DDG 37-46)	4
Charles F. Adams Class (DDG 2-24)	6
Forrest Sherman & Hull Class	3

FRIGATES

Oliver Hazard Perry Class (FFG 7-61)	27
Brooke Class (FFG 1-6)	11
Knox Class (FF 1052-1097)	15
Garcia Class (FF 1044-1051)	10
Glover Class (FF 1098)	9
Bronstein Class (FF 1037 & 1038)	7

MISC

Auxiliaries	23
MSO 427 Class Minesweepers	5

APPENDIX O

DEFINITIONS

1. Acquisition Method Code (AMC). A numeric code assigned by a procurement activity to document the results of a technical review of a particular part. [Ref. 1:p. S6-103.1]
2. Acquisition Method Suffix Code (AMSC). An alpha code assigned by a procurement activity to further describe the acquisition status of a part by providing information concerning engineering, manufacturing, and technical data. [Ref. 1:p. S6-103.2]
3. Actual Manufacturer. A manufacturer, who may or may not be the prime contractor, having the design control responsibility for a part. The actual manufacturer may produce the part in-house or by subcontracting. [Ref. 14:p. 3]
4. Annual Buy Value (ABV). The forecast quantity of a part required for the next twelve months multiplied by it's unit price. [Ref. 1:p. S6-103]
5. Bailment. The process whereby an item is leased to a nongovernment recipient with the agreement that the same item will be returned at a future time. The Government retains legal title to the item. The contractor uses the item in order to develop a technical data package for use in reprocurement. Reverse engineering uses this technique for developing data packages. [Ref. 37:p. 14-4]
6. Breakout. The improvement of the acquisition status of a part by deliberate management action to buy a spare part competitively which was previously bought noncompetitively, or to buy a part from the actual manufacturer which was previously bought from the prime contractor who is not the actual manufacturer of the part. [Ref. 1:p. S6-103.6]
7. Component Breakout. When breakout action is taken at a component level, usually as a result of form, fit, and function analysis.
8. Contract Data Requirements Lists (CDRL). A contract form, DD form 1423 which is used to list all technical

- data required to be delivered under the contract. [Ref. 23:p. App. B]
9. Contractor. The supplier of the end item and associated support items to the Government under the terms of a specified contract. [Ref. 14:p. 3]
 10. Contractor Technical Information Coding (CTIC). An alpha code assigned by a prime contractor to furnish specific information regarding the technical data for a part. [Ref. 1:p. S6-103.7]
 11. Data Item Description (DID). A detailed description and identification of data to be procured and delivered through contractual means. [Ref. 4: p. IIIA-1-3]
 12. Data Repository. A DOD entity responsible for receiving, cataloging, storing, and retrieving technical data. [Ref. 23:p. App. B]
 13. Design Control Activity (DCA). The contractor or Government activity assigned responsibility for the design of a particular part and for the preparation and maintenance of current engineering drawings and technical data for the part. [Ref. 1:p. S6-103.9]
 14. End Item. A final combination of end products, component parts, and/or material which is ready for its intended use, e.g., receiver, recorder, rifle, ship, or aircraft. [Ref. 4:p. IIIA-1-3]
 15. Lead Allowance Parts Lists (LAPLs). Used for guidance during the provisioning process for the determination of the range and depth of onboard repair part quantities, as well as the preparation of APLs. The LAPL contains data elements which represent the approved maintenance philosophy for the specific type of equipment. [Ref. 4:p. IIIA-1-4]
 16. Life Cycle Buy Value. The total dollar value of procurements that are estimated to occur over a part's remaining life cycle. [Ref. 29]
 17. Manufacturer. A person or firm who owns and operates a factory or establishment that produces, on the premises, materials, supplies, articles or equipment required under the contract. [Ref. 14:p. 4]
 18. Prime Contractor. A contractor having responsibility for design control and/or delivery of a system/equipment such as an aircraft, engine, ship,

tank, vehicle, gun, electronic system, or test equipment. [Ref. 14:p. 4]

19. Provisioning. The process of determining the range and quantity of items (i.e., spares and repair parts, special tools, test equipment and support equipment) required to support and maintain an end item of material for an initial period of service. [Ref. 4:p. IIIA-1-2]
20. Provisioning Requirements Statement (PRS). Specific provisioning requirements will be stated in the PRS. The PRS (DD Form 1949-2) will be included in the solicitation or contract. The PRS, in conjunction with the applicable DD Form 1423 (CDRL) entries, will delineate the specific procedural and deliverable data requirements applicable to a particular solicitation or contract. [Ref. 14:p. 5]
21. Provisioning Technical Documentation (PTD). The documentation furnished by contractors for the purpose of identification, determination of repair parts requirements, cataloging and contractual formalization of items to be procured through the provisioning process. The applicable Provisioning Military Specifications such as MIL-STD-1552, MIL-STD-1388, MIL-STD-1561, etc., specify format and content of PTD. PTD includes, but is not limited to, Provisioning Lists, associated drawings, item descriptions, and EAM cards. [Ref. 4:p. IIIA-1-7]
22. Replenishment Spare Part. A consumable or repairable part purchased after provisioning of that part used for replacement, replenishment of stock, or use in the maintenance, overhaul, and repair of equipment. [Ref. 1:p. S6-102.11]
23. Reprourement Data. A composition of specifications, plans, drawings, standards, and other data sufficient to permit the competitive follow-on procurement of an item. [Ref. 23:p. App. B]
24. Reverse Engineering. The process by which parts are examined and analyzed to determine how they are manufactured, for the purpose of developing a complete technical data package including Level III drawings. The purpose is to develop a data package on an item suitable for manufacture by a second source. [Ref. 10]
25. Source Code. A code assigned to the item indicating the source (procured, manufactured, assembled) from which the item will be obtained. [Ref. 4:p. IIIA-1-8]

26. Technical Data. Specifications plans, drawings, and standards used to describe the Government's requirements for acquisition. [Ref. 1:p. S6-103.12]
27. Vendor Item. An item which is attached to the end item produced by the contractor and which is procured by the contractor on the open market or from established sources and for which the contractor is not the design activity. [Ref. 14:p. 5]

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